A McGRAW-HILL PUBLICATION

Chemical Week

August 23, 1958

Price 35 cents

Shooting the Moon. How CPI figures into the most ambitious missile effort yet. . . . . p. 21

Drop in tin demand, Russian competition pinch marketers. Their hope: organotins . . p. 47

Novel communications setup integrates company's operations in 27-city network . p. 57

Spotlight on wholesalers' manufacturing plans. Nationwide survey . . . . . p. 75

CW Report: pharmaceuticals. $2.25-billion industry flourishes despite attacks . p. 87

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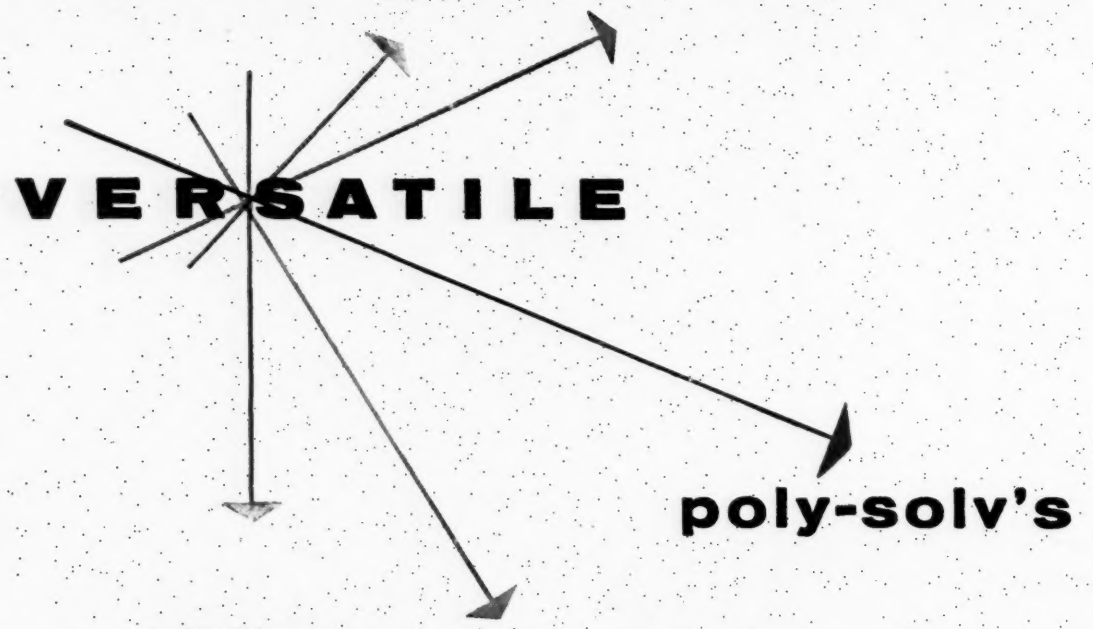

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Chemical Week

TOP OF THE WEEK

AUGUST 23, 1958

- **ICI licenses Scientific Design's terephthalic acid process** for a 30-million-lbs./year plant. It's the process behind Amoco's recent phthalic price cut ..... **p. 23**
- **Tips on cost-cutting plant construction** found in Commercial Solvents' new methylamines unit ..... **p. 33**
- **Enhancing the sales appeal of halocarbon fluids** is merchandising challenge for specialties producer ..... **p. 41**
- **Nitrile silicone rubber,** developed by General Electric's researchers, may be commercial by early '59 ..... **p. 79**

15 VIEWPOINT

15 OPINION

15 MEETINGS

17 BUSINESS NEWSLETTER

21 Missiles to the moon: chemical companies have important role in both Air Force and Army attempts.

23 Dow President Doan sees new products as key to slowly rising sales and earnings.

23 ICI's new terephthalic plant will use xylene oxidation process that brought 19% cut in U.S. phthalic price.

24 Surprise nylon entry: Commercial Solvents—with its own process—will be making caprolactam by December.

24 Synthetic rubber makers win Justice Dept. praise for "competitive zeal," rebuke for "uniform pricing."

29 WASHINGTON NEWSLETTER

33 ENGINEERING
How CSC saved on equipment outlay, building costs for new methylamines plant.

41 SPECIALTIES
Halocarbon Products Corp. is trying to work itself out of "one customer" sales bind.

47 MARKETS
Tin producers' triple troubles: demand dip, cut-rate exports from Russia, advent of aluminum cans. One hope for future sales—organotins.

57 ADMINISTRATION
National Distillers' Teletype network knits 40 plants and offices with combined communication-and-data-processing system.

58 Minnesota courts permit grocery stores, supermarkets, to sell drugs.

60 Chemical industries set high mark in fringe benefits to workers.

65 PRODUCTION
Tidewater Oil's new system speeds parts delivery, saves $50,000/year.

71 TECHNOLOGY NEWSLETTER

75 SALES
Chemical distributors, wholesalers, plan to move further into manufacturing.

79 RESEARCH
General Electric's newest silicone: nitrile silicone rubber. It's in pilot plant.

83 MARKET NEWSLETTER

87 CW REPORTS
The $2.25-billion/year drug industry is thriving, despite recession, government attacks.

100 CHARTING BUSINESS
Aerosols skim cream off the $61-million shaving soap market.

COVER PHOTO COURTESY SUN OIL CO.

40,695 copies of this issue printed

Vol. 83
No. 8

Chemical Week is published weekly by McGraw-Hill Publishing Co., Inc. 330 W. 42nd St., New York 36, N.Y. Place of publication: 3rd and Hunting Park Ave., Philadelphia 40, Pa. Second-class mail privileges authorized at Philadelphia. Subscription: $3/year in U.S.A. Send subscription correspondence and change of address to Fulfillment Manager, Chemical Week, 330 W. 42nd St., New York 36, N.Y. Please see page 5 for subscription requirements.

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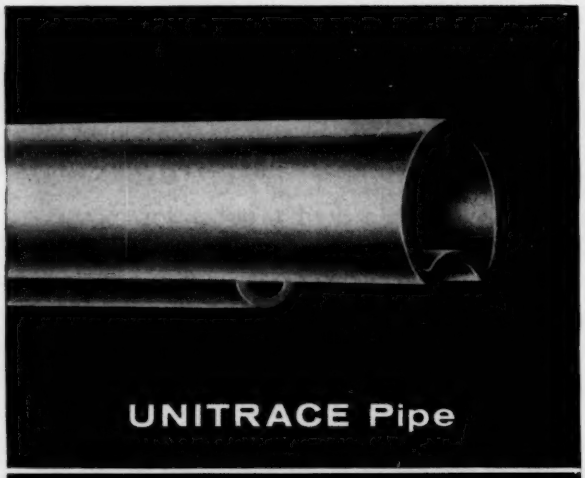

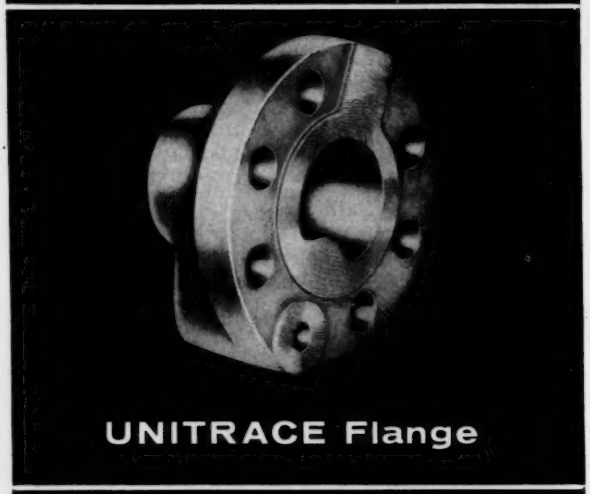

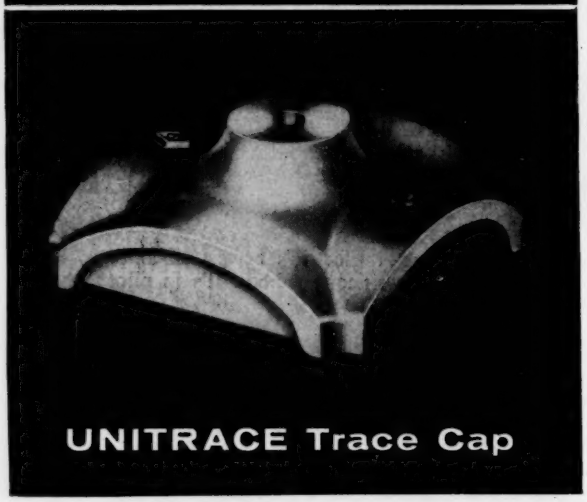

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AUGUST 23, 1958 **Vol. 83, No. 8**

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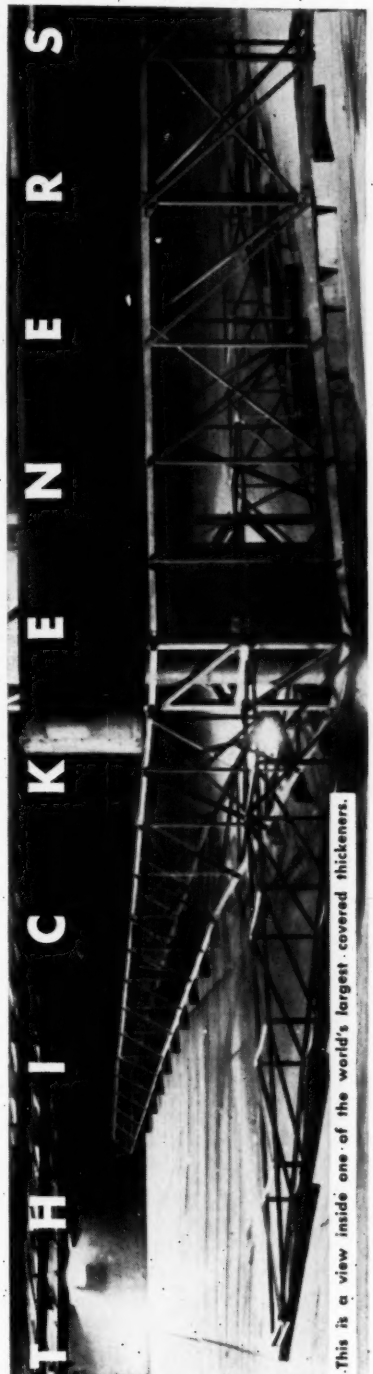

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why do insects die?

To create insecticides, chemists must know how insects react to certain chemicals. One of the most interesting stories can be told about o,o-diethyl o-p-nitrophenyl thiophosphate, commonly called parathion.

Body nerves contain a chemical called acetylcholine, which helps to transmit nerve impulses. After the impulse is transmitted, an enzyme destroys this chemical. Parathion (which the body converts to paraoxone) destroys the enzyme, and this allows the acetylcholine to accumulate in the system. The insect's body goes into uncontrollable nervous activity, causing tremors, convulsions, paralysis and death.

Parathion is prepared by treating thiophosphoryl chloride with sodium ethylate and allowing the product of this reaction to condense with sodium p-nitrophenate, a derivative of USS One-Degree Nitration-Grade Benzene. United States Steel, 525 William Penn Place, Pittsburgh 30, Pennsylvania.

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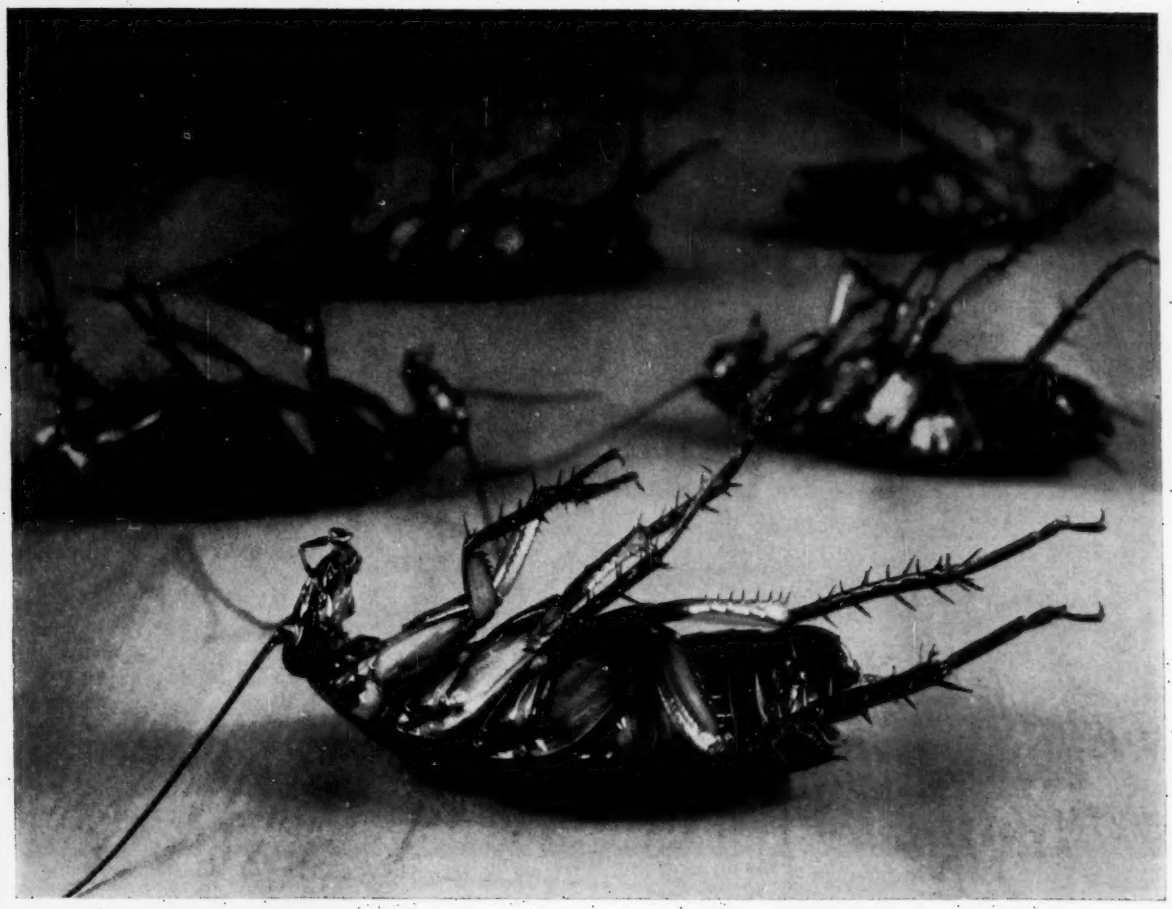

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There's a new way to sell food products, communications, cameras and many other things today. Now, too, a new way to sell your product to the Chemical Process Industries...

# of Tomorrow

in today's CPI selling!

This is "the year of the hard sell." But that's what they say about every business year. We'd rather call 1958 "the year of the smart sell." *Smart* in the sense that now is the time for a change in strategy . . . for sharper sales and promotion tactics . . . for new and better ways to move more of your products at lower cost.

Cost is the key to successful selling in the Chemical Process Industries. With the "net profit squeeze" closing in, *CPI-Management* is cost-conscious with a vengeance. Their responsibility to make profits means they must spend at a profit. No single group could be more personally concerned with the dollar-savings your equipment, materials or service can deliver. Certainly nobody else wields such combined buying influence. For *CPI-Management* nails down every major function . . . both "technical and non-technical" . . . from upstairs with *top administration*, to *production and plant operations, design and construction, research and development, purchasing and sales.*

Such cost-consciousness is contagious. And because your profit-problems are compatible with your customers', it makes sense to sell *CPI-Management* in CHEMICAL WEEK. To hit hard and often in the one newsmagazine they read every week. To move fast and decisively in the one publication that puts the vital issues in proper perspective, points the way to trends and decisions. Concentrate your advertising power here, and you *put the TOUCH OF TOMORROW in today's CPI selling.*

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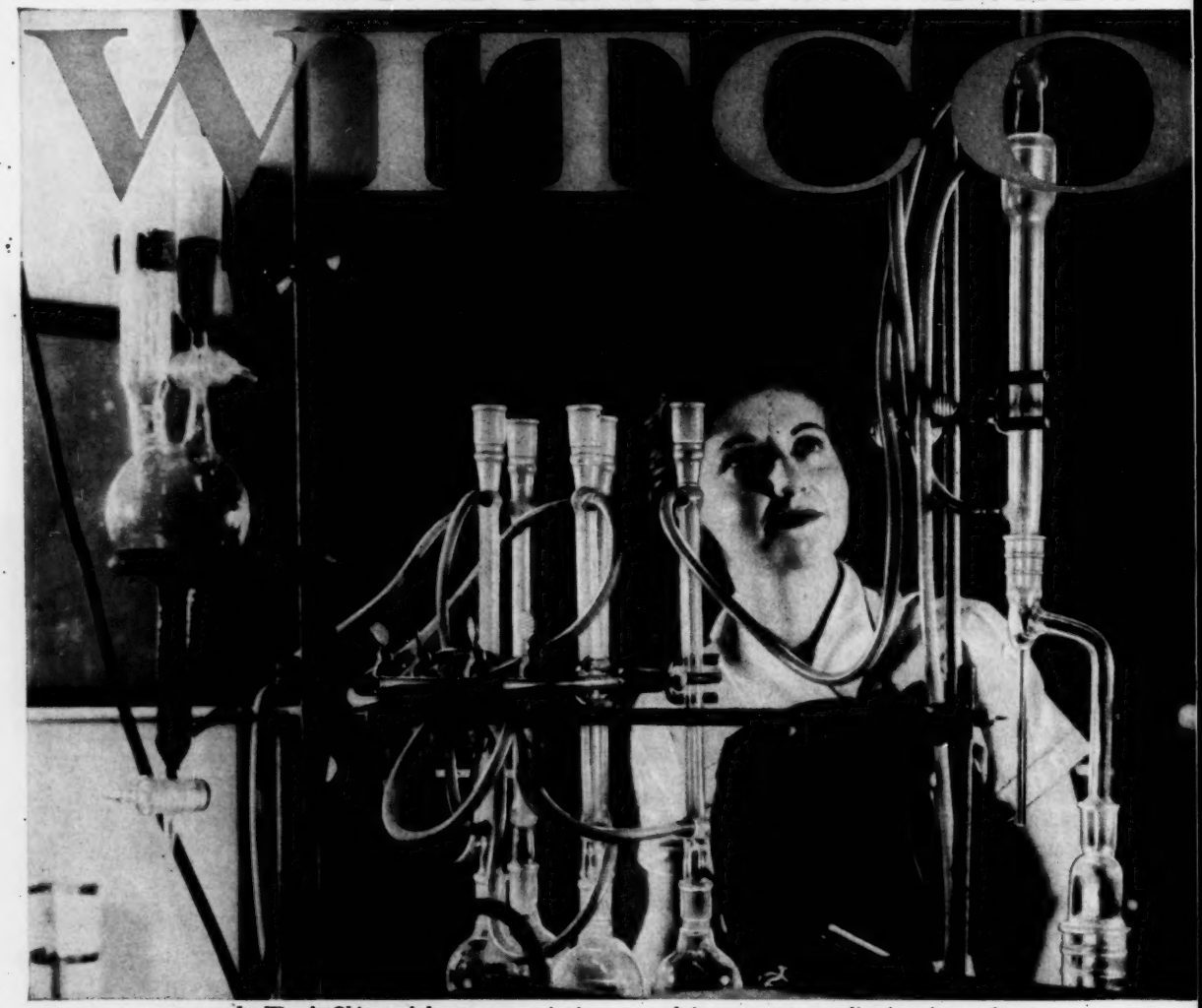

In Witco's Chicago laboratory, continuing research into stearates applications is opening up ever-widening horizons for these versatile chemicals.

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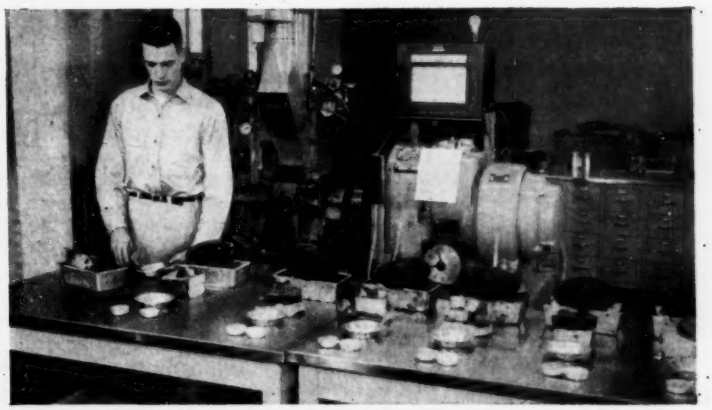
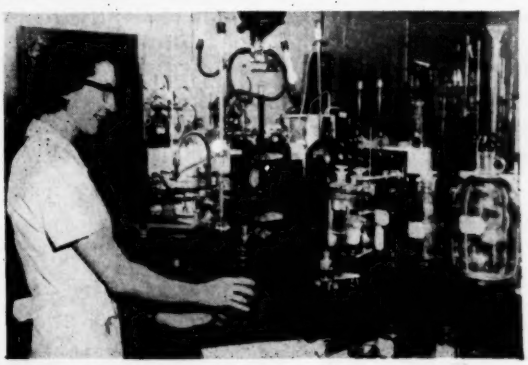
You can't buy better products than Witco's... and you won't find more helpful technical service anywhere. Any way you look at it, you get more for your chemical dollar when you buy Witco.

Detergents and wetting agents developed by Ultra Division's Paterson laboratory have proved outstandingly efficient in uses ranging from cosmetics to leather processing.



Uniform quality of carbon blacks is vitally important in the rubber industry. Here, test samples are being prepared in the Rubber Chemical Division's Akron laboratory.



At Emulsol Chemical Division's Chicago laboratories, research goes forward in developing improved emulsifiers for better agricultural chemicals and foods.

COMPANY

ULTRA Chemical Works · CONTINENTAL Chemical Works · Emulsol · Pioneer Chemical Works

NEWS BRIEFS *that plant profit seeds*

Alert chemical processors are watching for two kinds of news these days. News about new chemical developments and news about new uses for established chemicals. They can often spot idea seeds that grow into profit blooms when nourished by decisive, intelligent action. These two pages present, in concise form, news about several Dow chemicals . . . worthwhile reading for C.P.I. men on the lookout for ideas.

You may wish to check certain items in this advertisement and forward to those concerned in your company.

ROUTE TO:

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DOWICIDE: LIFE PRESERVER FOR PRODUCTS AND PROFITS

An axiom of modern marketing is: "Make it better, sell it better!" Certainly one of the world's best sales stimulators is product improvement. But once you've improved the product, how do you keep it that way?

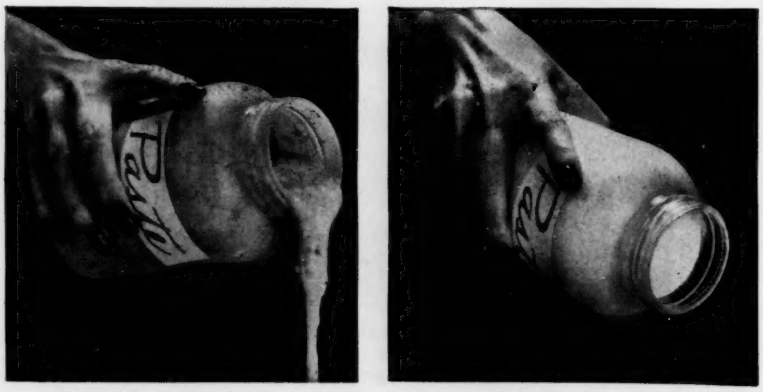
That's where Dowicide® comes in. The manufacturer of a new liquid starch faced up to the "keeping" problem. His new synthetic starch lasts so long in shirts, linens and the like (up to 8 washings) that a bottleful would last much longer, too. This *could* mean trouble . . . decomposition caused by bacteria and fungi. He brought the problem to Midland, where Dow researchers recommended the addition of Dowicide A to his formula. Happy result: the attack by destructive bacteria and fungi was prevented by the chemical curtain of Dowicide A.

14 different Dowicide preservatives provide product quality "insurance" against the ravages of time, molds, bacteria. They keep shoe polishes polishing, floor waxes waxing, and baler twine tough and tight. One of the Dowicide preservatives protects apples, pears and citrus fruits on the journey from tree to table. Losses from decay due to bacteria are cut by 65% or more, even on transoceanic shipments!

A manufacturer of fine carpeting found that twisted cellulose twine makes an ideal carpet backing, but it must be protected from attack by mildew. A Dowicide preservative does the job well for just a few cents per yard. Dowicide preservatives also guard quality in textiles, ceramics, leather, paper, paint, agricultural and building products.

Performance tests with library paste graphically illustrate the value of Dowicide preservatives. Two samples (see photo) were inoculated with microorganisms and exposed for one week at a temperature of 86°F. The untreated sample showed mold growth and developed an objectionable odor. The sample treated with a Dowicide preservative resisted attack, retained its consistency and other characteristics.

Most manufacturers and processors who have had experience with Dowi-



Untreated sample of library paste (left) shows spoilage resulting from mold attack. Sample at right, treated with Dowicide, remains clean and useful.

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Preservatives • Polyalkylene Glycols
Glycol Ethers • Alkalies • Phenoli
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YOU CAN DEPEND

cide make it a point to check with Dow whenever they're making a change in a product or working on a new one. That's the best time to find out which Dowicide preservative will best do the product protection job required. If you'd like more information about Dowicide preservatives, write to the address below for literature and data.

Gum with no "gel out"

News about Methocel® is making quite a stir in the C.P.I. these days. This non-ionic, water-soluble gum has more applications in chemical processing than a cat has lives.

Wide line widened. Three new Methocel types, 60 HG, 70 HG and 90 HG have recently joined the ranks to supplement the already extensive Methocel family. Together, they give the chemist an unparalleled selection of thickeners, emulsifiers, stabilizers, binders and suspension agents.

Methocel 90 HG is available in a wide range of viscosities including a super-high 15000 cps material for exceptionally high thickening efficiency. The 90 HG type, developed for its non-gelling characteristics, is useful where elevated processing temperatures are encountered . . . polymer processing for example. Solutions of Methocel 90 HG retain their functional properties up to 194°F. At this temperature they may lose some clarity which is restored on cooling.

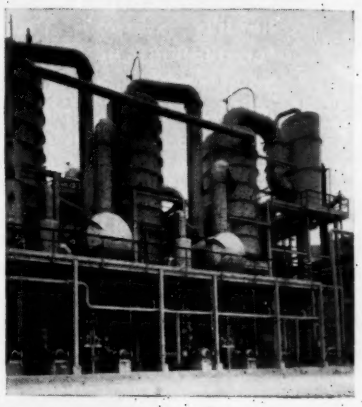
Fact-filled book. The new formulations and viscosities, as well as simplified techniques to put Methocel into solution, are described in the recently published Methocel manual. This colorful 60-page reference book contains a large section on applications, 13 useful charts and a complete bibliography.

★ ★ ★ ★

New ideas anyone? If you'd like to know more about the Dow chemicals discussed on these pages, or those listed in the box below, write THE DOW CHEMICAL COMPANY, Midland, Michigan, Chemical Sales Department 7538.

GOOD SIGN:

Caustic on the march



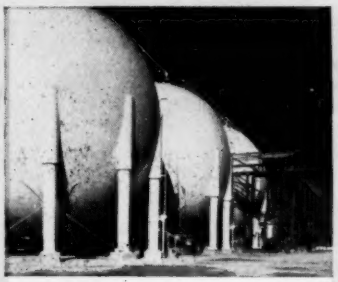
New facilities supplement Dow nationwide caustic soda distribution network.

The national consumption of caustic soda—traditionally a reliable economic barometer—is being watched more closely now than ever before. This holds particularly true in the chemical process industries where a large percentage of the total caustic tonnage is used. An encouraging side light is the new activity at Dow these days . . . activity that has a bearing on future caustic indices.

Add Plaquemine. Dow is forging new links in its far reaching chain of distribution centers for caustic soda. A new producing plant at Plaquemine, Louisiana, is scheduled to go on stream soon. Other new terminal points have been added, bringing the total to eight. Twelve Dow producing points and shipping terminals are strategically located to give C.P.I. customers throughout the nation the best possible break on their freight dollar.

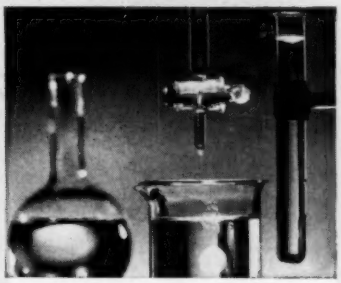
FAST FACTS

about 4 more Dow chemicals



AMMONIA

Huge inventories maintained by Dow assure abundant supply . . . several shipping terminals guarantee prompt delivery.



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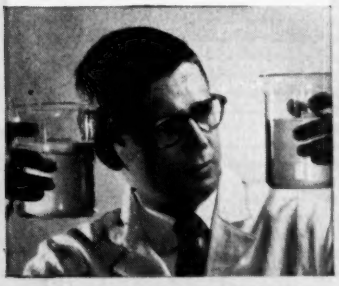
Upgrade products with these two versatile Dow chemicals . . . receive them from either of two shipping points, whichever is most convenient.



chemical processing industries

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RESINS
CHEMICALS

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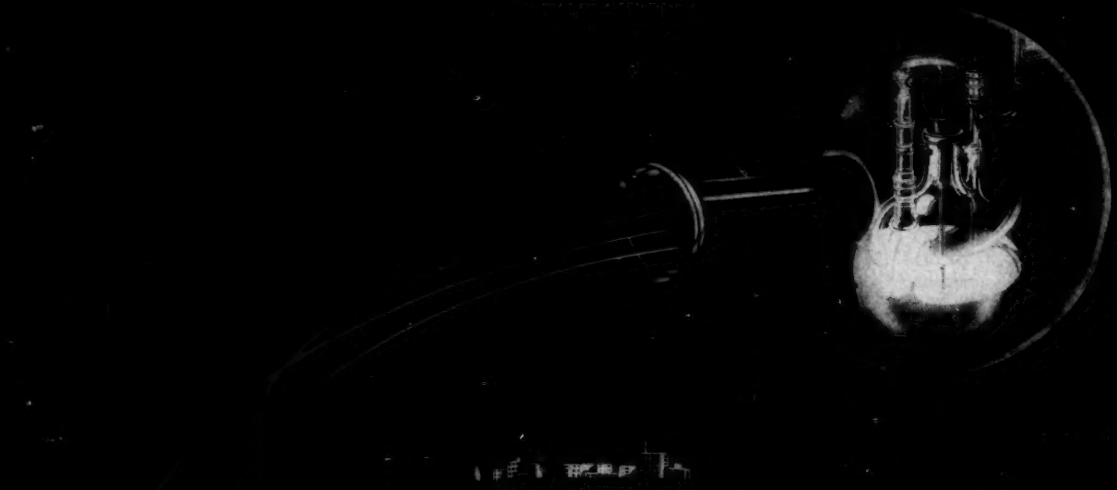
To ensure on-the-dot deliveries for the most demanding of customer production schedules, Catalin has pioneered in the field of industrial distribution. A network of plants and warehouses, linked in a vast teletype system, dispatches every order with utmost speed and reliability.

Catalin welcomes inquiries from interested manufacturers.



MOLDING COMPOUNDS

CHEMICALS

- 2,2'-AZO-BIS-ISOBUTYRONITRILE
- ULTRAVIOLET ABSORBER UV-1
- SODIUM AMIDE
- ALPHA-AMINO PYRIDINE
- 2,6-DI-AMINO PYRIDINE
- MUCOCHLORIC ACID
- PARACHLOROMETACRESOL
- THIOSEMICARBAZIDE
- HEPTALDEHYDE
- UNDECYLENIC ACID
- 11-BROMOUNDECYLENIC ACID
- HYDRAZINE SULFATE
- BACTERIOSTAT CS-1
- METHYLENE ANILINE
- OCTYL PHENOL and NONYL PHENOL
- ANTIOXIDANT CAO-1: 2,6-Ditertiary-Butyl-Para-Cresol
- ANTIOXIDANT CAO-3: Butylated Hydroxy Toluene
- ANTIOXIDANT CAO-5: 2,2'-Methylenebis (4-Methyl-6-Tertiary-Butyl Phenol)
- ANTIOXIDANT CAO-6: 2,2'-Thiobis (4-Methyl-6-Tertiary-Butyl Phenol)

INDUSTRIAL RESINS

Catalin

OPINION

Inches Aren't All

TO THE EDITOR: Russia's research *(May 31, p. 76)* analysis by Brooks based on the number of inches devoted to each subject in *Chemical Abstracts* is distorted in favor of the Russians. Abstracts of articles in Russian journals (which it is known will not be readily read by U. S. chemists) are purposely more complete and lengthy than abstracts of English, German and U. S. research articles.

Even so, the Russian activity in metallurgy is noteworthy.

HALLOCK C. CAMPBELL
Director of Research
Arcos Corp.
Philadelphia

Says Dr. Brooks: "I naturally anticipated the objection raised by Dr. Campbell and had written Dr. Crane, Editor of *Chemical Abstracts*. He replied that the abstracts of articles published in journals of the American Chemical Society were generally briefer than others, but he did not think this fact would appreciably affect my summaries."—ED.

Delhi Plus Taylor

TO THE EDITOR: Shakespeare's famous line, "a rose by any other name . . . " doesn't apply too aptly to this practical business world. Consequently, we would like to call your attention to an error in company nomenclature that appeared in your otherwise excellent article on Corpus Christi *(July 12)*.

The Taylor Oil & Gas Co., which you identified in the photo illustrating the article, was merged with Delhi Oil Corp. . . . to form the present Delhi-Taylor Oil Corp. . . .

P. J. ROCHFORD
Sam J. Gallay/Advertising
New York

Shutdown Planning

TO THE EDITOR: . . . [Re] the article concerning shutdown planning by R. B. Wilson *(June 14)*. . . .

In general, I think the article is satisfactory and spotlights attention on an important area as a result of increased plant complexity. I would like to suggest a change in one reference to Du Pont that included the statement, "A recent Du Pont study showed that in a 50-unit integrated system the entire system failed to operate when one component unit was down 10% of the time." As this statement is somewhat misleading, I would like to suggest the following wording for that sentence: "A recent Du Pont study showed that if 50 units with an average unit availability of 90% were integrated into a continuous system, the system would be theoretically inoperable unless special measures were taken."

J. C. JESSEN
Engineering Service Division
E. I. du Pont de Nemours & Co.
Wilmington, Del.

For a full report on Du Pont's maintenance system, see CW, *June 29, '57, pp. 64-68*—ED.

Woman Sells Imports

TO THE EDITOR: We have read with great interest . . . "Girls Get Their Chance" *(June 21, p. 80)*, which made us think about our organization, having Mrs. R. V. Bakalinski engaged in sales for over 34 years.

Our organization is known very well in the chemical industry as brokers and manufacturers' representatives, and our Mrs. Bakalinski has successfully managed large and small transactions.

It is a matter of fact, thanks to her abilities, imports of chemicals from Poland have been introduced into the U. S., and since 1954 many, many millions of dollars worth have been brought in.

B. HENZELOFF
Kolon Trading Co., Inc.
New York

MEETINGS

Gordon Research Conferences, series of 36 topics, Colby Junior College, New Hampton School and Kimball Union Academy, all in New Hampshire, ends Aug. 29.

"Atoms for Peace," second international exhibition, Geneva, Switzerland, Sept. 1-14.

American Chemical Society, 134th national meeting, Chicago, Sept. 7-12.

DCAT, 68th annual meeting, Sagamore Hotel, Lake George, N.Y., Sept. 11-14.

VIEWPOINT

OVERLOOKED in the current debates on the U.S. patent system is the question of what happens to patents that are financed by, and assigned to, the U.S. government. Except for those with specific military applications, most U.S.-owned patents find no useful application—despite their availability to all on royalty-free licenses.

But in the opinion of many who have looked more deeply into the subject, government-owned patents lie idle because they are available to all, royalty-free.

Look at it this way:

The cost of selecting one of the disclosures in a government patent and developing it to the point where it can "go commercial" is usually an expensive business. (One authority cites the rule of thumb that development can cost five times as much as getting a patent in the first place.) And a company is clearly reluctant to spend the needed development money if it knows that competitors later can benefit from the results of the investment by getting their own royalty free licenses on the patent.

In the coming debate on U.S. patent policy, the granting of exclusive, royalty-paying licenses on government patents should be seriously considered. For example, allow companies to bid for a five-year exclusive license on a patent; grant the license to the company that offers the highest royalty.

If it would allow a five-year headstart, a government patent would become more attractive to most companies. Result: government patents—for which our tax dollars have been spent—would become a more valuable property to the government, and thus to us.

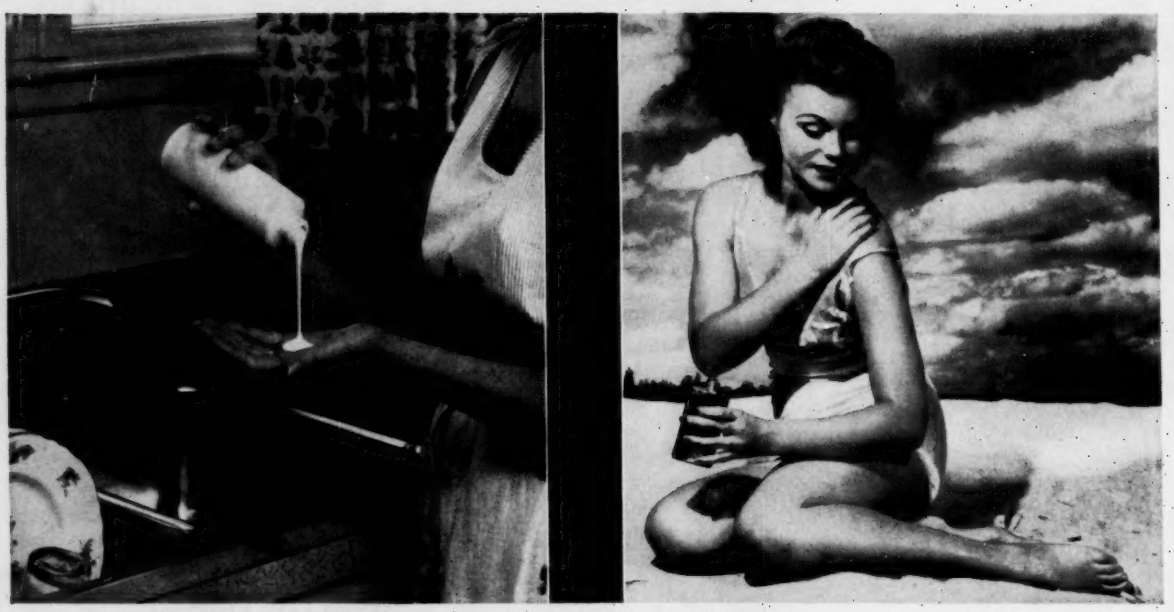
And it would mean a small but steady influx of royalty dollars to the U. S. Treasury.

H. E. Johnson

Editor-in-Chief

put "protect-appeal" in cosmetics

WITH DOW CORNING SILICONE FLUIDS



At work or at play, women like the protection of silicones in creams and lotions.

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Business Newsletter

CHEMICAL WEEK
August 23, 1958

Earnings reports in this week show sales gaining, profits still mixed.

Michigan Chemical boosted its six months' sales to $5.4 million, up 27% over the first half of '57, while earnings slumped to $232,053, down 33%.

American Agricultural Chemical, benefiting from a good year for farm chemicals, had sales of $92.8 million in the fiscal year ended June 30, compared with $86 million in the '56-'57 period. Profits rose to $4.9 million, a gain of 5%.

U.S. Borax & Chemical's June quarter sales hit $14.5 million, up 12% over the second three months of '57. But the company netted only $891,692 in the same period, 35% lower than last year.

Kawecki Chemical's six months' sales were up slightly, to $1.8 million. Profits were $46,642, compared with a net loss of $36,528 in the first half of '57.

•

Russia has unveiled foreign trade figures for chemicals and other products for the first time in about 20 years.

Chemical imports in '56 totaled about $54 million; exports, almost $40 million. Among the important imports (in metric tons): caustic soda, 68,600 tons; soda ash, 143,000 tons; sodium sulfate, 55,100 tons; ethyl alcohol, 57,500 tons; calcium carbide, 67,300 tons. Imports of materials for plastics production totaled $11 million.

Key exports: sulfuric acid, 14,900 tons; benzene, 139,100 tons; creosote oil, 46,500 tons; toluene, 18,300 tons; naphthalene, 29,400 tons; synthetic rubber, 22,700 tons; phosphatic fertilizers, 1.2 million tons.

•

Plax Corp. (Hartford, Conn.) has sold its polyethylene film and tubing extrusion equipment and processes to Chase Bag Co. (New York). Plax feels the polyethylene packaging industry has come to demand integration between extruder and package maker. It will concentrate on using oriented materials such as polystyrene for producing film, sheet and bottles.

Chase has been eyeing polyethylene's inroads on the produce bag market. After buying the film for some time, it has now decided to follow the integration trend.

•

Merger of AFL-CIO's two chemical labor unions in '59 is probable.

After several years of mild flirtation, International Chemical Workers Union and the Oil, Chemical & Atomic Workers Union suddenly got serious about unification. This turn of events came late last week during a two-day meeting of both unions' top officers (*CW, July 12, p. 46*).

The unions' executives said they "reached agreement on a detailed program that will provide a definite timetable of preparations for the merger of our two unions." Next steps: submitting this plan to the executive boards and then to the rank-and-file memberships of both unions.

Thus, it's possible that the merger program will be approved in this fall's conventions (OCAW meets Sept. 22-26 in Long Beach, Calif.; ICWU meets Oct. 6-10 in Washington, D.C.); and that a formal organizational convention of the new union could be held next year.

Of the two, ICWU's convention may have more import for industry. Now, it appears that incumbent President Mitchell—who is regarded as a strong advocate of merger with OCAW, company-wide bargaining, and the general economic doctrine of Walter Reuther—is almost certain to be reelected. Chances for one prospective rival—Vice-President John Gratz, of St. Louis—suffered a setback last month in the ending of ICWU Local 12's 10-week strike against Monsanto Chemical at Monsanto, Ill. Gratz had advised the local to stick to its early demands, and some management men suspected that his aim was to try to get better terms than at other Monsanto plants, possibly discrediting Mitchell thereby. While Gratz was on vacation, Mitchell re-entered the negotiations and got credit for helping to nail down the settlement.

•

Here's further word on that chlorinated hydrocarbon plant slated for construction in southern California by American Chemical Corp. (*CW Business Newsletter, Aug. 16*).

American—which is jointly owned by Stauffer Chemical and Richfield Oil (not Shell, as reported last week)—will have access to one of the few big ethylene sources on the coast, Richfield's Watson refinery. Stauffer will supply chlorine and insecticide marketing know-how.

•

Still another antitrust suit has been fired at chemical process companies—this one against Sherwin-Williams (Cleveland) and several affiliated paint producers.

This latest action by the Justice Dept.'s Antitrust Division alleges a conspiracy to fix prices in violation of the Sherman Antitrust Act. Specifically, the complaint charges that the defendant companies have been making price-maintenance agreements with various independent jobbers and wholesalers; and that such agreements are illegal because the defendant companies are in competition with those wholesalers in that they also sell Kem tradename paint products directly to retailers.

At first glance, the allegation—generally denied by the paintmakers—appears similar to the government's 1952 action against McKesson & Robbins (*CW Washington Newsletter, May 25, '57*), except that the new suit is directed at six defendants rather than one.

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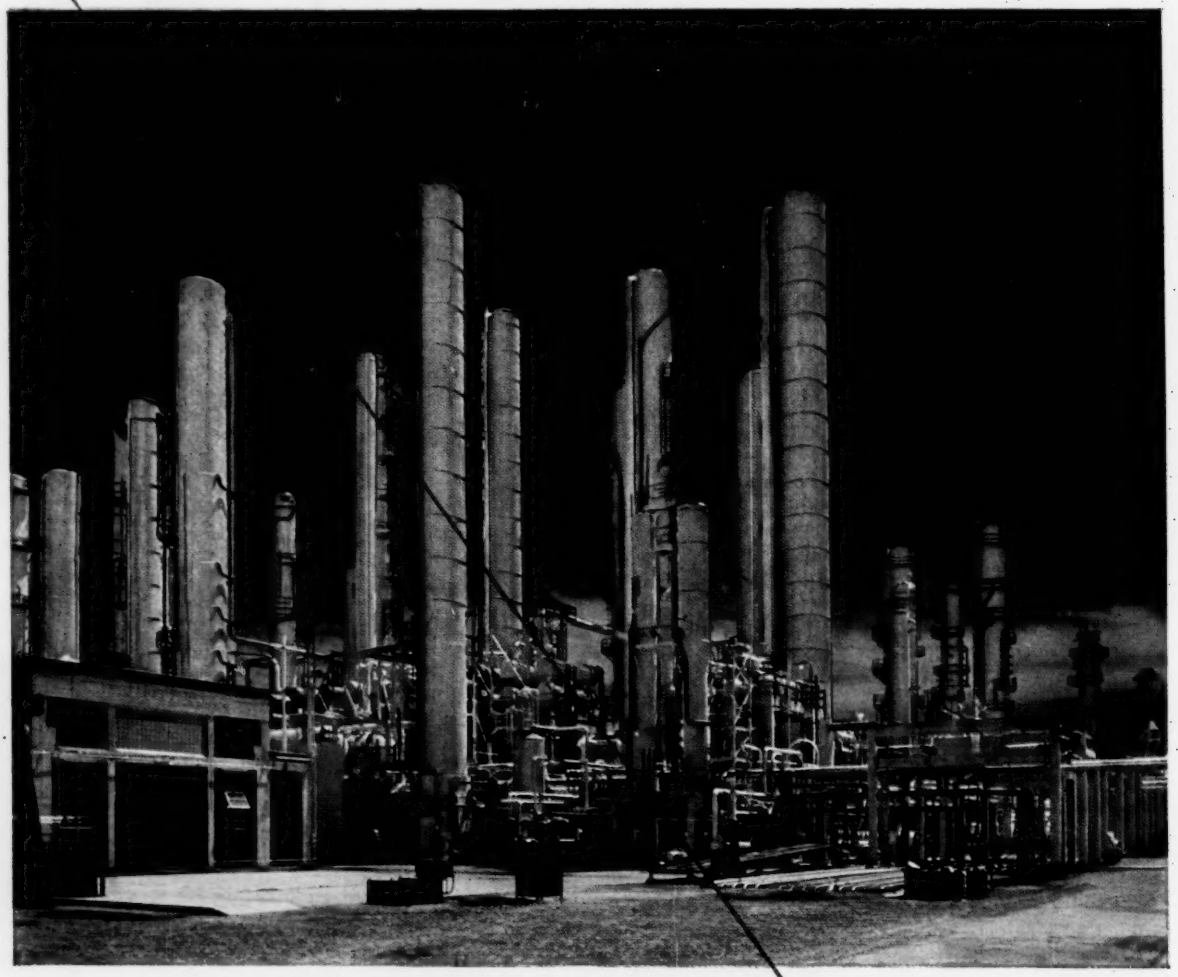

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Near gantry housing 'moon-shoot' missile, chemical men Pruett, Morrison check fuel make-ready steps.

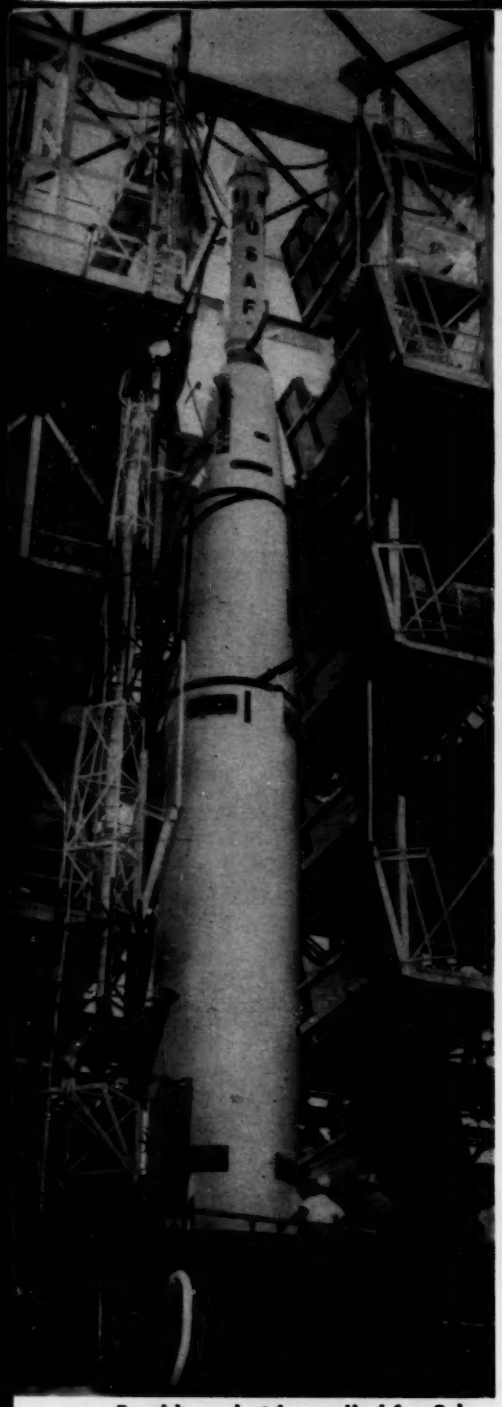
Chemical Men Muster for More Moonshots

Field Supervisor L. B. Pruett of Aerojet-General Corp. and Field Operations Director R. B. Morrison of Space Technology Laboratories, shown in CW's exclusive photo (above), were among the squad of chemical men on the first team in the ill-fated "moonshot" effort this week. Despite Sunday's failure—50,000 ft. above Cape Canaveral, Fla.—their "moon-shooting" work isn't done.

While Pruett and Morrison late last week were checking on the readiness of liquid propellent for this week's Project Farside launching, engineers and scientists for chemical propellent makers—notably Hercules Powder, Thiokol Chemical—were preparing for other moonshots — the Army's Project Juno II, as well as new Air Force Farside attempts.

The latter will try—as Project Farside did—to send a ballistic missile as far as the moon. Object: to gather new information about physical conditions in space; and to test new equipment, materials and theories in long-range rocketry.

Strong Evidence: And in both these ventures, contributions of the chemical process industries are strongly in evidence. Chemical companies are supplying U.S. missilemen with special metals, alloys, plastics, ceramics and —most notably—solid and liquid propellents.



Farside rocket is readied for firing.

For Farside, Hercules provided the third stage, a modified Vanguard missile with a solid-propellent engine. The fourth or terminal stage, which would have tried to push the instrument package into orbit around the moon, was a specially adapted solid-fuel retro-rocket made by Thiokol.

The Hercules propellent reportedly is double-based—i.e., a single material that acts as both oxidizer and fuel. Although the exact composition is classified information, it's known that this propellent is more powerful than that of the conventional Vanguard.

The Thiokol rocket is much smaller, would have been set off by a radio signal when about 5,000 miles away from the moon.

Tailor Made: The second, third and fourth stages of the Army's moon rocket, slated to be launched in September, are also solid-fueled. They'll consist of Sergeant missiles, made by Thiokol with Thiokol solid propellent. These Sergeant rockets will be specially scaled down and adapted for the job.

First stage of the Army moon vehicle will be a giant Army Jupiter-C, the liquid-oxygen propelled long-range missile that successfully put the Explorer satellites into orbit.

Whatever the outcome of these first scheduled moonshot launchings, others are sure to follow. But the significance to the chemical industries of this first attempt to leap into space is hard to overstate. Successful or not, the projects dramatize the potential moon-high demand for chemical materials and know-how that will be needed for space ventures.

Liquids Not Fading: And the chemical industry is not ignoring these needs.

Despite the inroads being made by solid propellents, requirements for liquid oxygen, nitric acid and other liquid-propellent components are not likely to fall off rapidly.

To help meet the demand for liquid oxygen (LOX), Union Carbide's Linde Co. Division will build a new 300-tons/day air separation plant in Pittsburg, Calif. First section of the plant—capacity: 115 million cu.ft./-month—is scheduled to be in production by June '59. The full plant, which will turn out 200 million cu.ft./-month, will be ready a few months later. A Linde spokesman says most of the output will go to West Coast missile makers.

New Oxidizer: And Hercules Powder, steadily broadening its role in the missile program, is blueprinting a new nitrogen tetroxide unit at its Hercules, Calif., works. While not yet a conventional component of liquid fuel, the tetroxide has shown promise as an oxidizer and may well find a place for itself in longer-range missiles. Initial quantities of nitrogen tetroxide will be available in about four months.

Solid propellents are finding new applications, and demand for them is growing fast. Solid-fuel producers (e.g., Thiokol, Grand Central Rocket, Aerojet and others)—as well as makers of a wide range of chemical materials—have benefited and will continue to garner profit and prestige from their contributions to the rising fund of missile know-how.

WHO'S DOING WHAT IN MOON-SHOOT PROJECTS

U.S. AIR FORCE ATTEMPT: PROJECT FARSIDE

	1st Stage	2nd	3rd	4th
Missile	Thor	modified Vanguard	modified Vanguard	retro-rocket
Propellent	liquid	liquid	solid	solid
Engine Contractor	North Am. Aviation	Aerojet	Hercules	Thiokol
Prime Contractor	Douglas	Martin	Hercules	Thiokol

U.S. ARMY ATTEMPT: PROJECT JUNO II

	1st Stage	2nd	3rd	4th
Missile	Jupiter	Cluster of 11 Sergeants	Cluster of 3 Sergeants	1 Sergeant
Propellent	liquid	solid	solid	solid
Engine Contractor	North Am. Aviation	Thiokol	Thiokol	Thiokol
Prime Contractor	Chrysler Corp	Jet Prpsn. Lab; Sperry	Jet Prpsn. Lab; Sperry	Jet Prpsn. Lab; Sperry

Scientific Design's Landau and ICI's Whitby after signing contract.

Agree on Amoco Oxidation?

The smiling faces of Ralph Landau, executive vice-president of Scientific Design, and George Whitby, managing director of Imperial Chemical Industries' (London) Fibres Division (above), signaled the completion this week of their negotiations for design of a new, 30-million/lbs.-year terephthalic acid plant.

You can't tell it from the picture and he won't admit it, but Landau's smile may well be one of satisfaction —stemming from what appears to be a resounding vote of confidence in his particular brainchild, the xylene oxidation process that Scientific Design sold to Amoco Chemicals.

The plant will furnish ICI with the key intermediate for its expanding production of Terylene polyester fiber and Melinex polyester film. To be built at the company's gigantic Wilton Works, the unit will employ what's described only as a "novel processing technique." Both Scientific Design and ICI are silent on details of the technique. Nor will Amoco say anything. But the facts clearly indicate that the novel processing technique and Amoco's process are alike.

Parallel Paths: The Amoco process is a liquid-phase, air oxidation capable of converting a mixed xylene feed into a mixture of phthalic acids (i.e., phthalic anhydride, isophthalic and terephthalic acids). Right from the start, it was realized that this would involve a radical new approach. The wealth of patent literature on the subject (e.g., Australian Patent Application 16742/56; Belgian Patent 546,-191; U.S. Patent 2,833,816) strongly suggests that the real secret of the process is a metal catalyst in "the conjoint presence of bromine or a bromine compound."

The foreign patent literature also clearly indicates that ICI has been busily researching a similar path. For example, a Belgian patent on oxidation of organic substances (550,529) deals with a liquid-phase oxygen (or air) oxidation—carried out in the presence of bromine alone or bromine and an oxidation catalyst.

ICI has never published it widely, but the company has admitted that a U.S. company had established prior claim to a terephthalic acid route ICI was researching. The British weekly, *Chemical Age* (May 3, '58, p. 828), reported: "Dr. Caress (chairman of ICI's Fibre Division) said that ICI workers had discovered a new route for making the intermediate chemical terephthalic acid quite recently, but were beaten to the post by a U.S. company. ICI has made an arrangement with them which may lead to our using this important process in Terylene III.' "

Further indication that ICI is licensing the Amoco process: if ICI's process were different it would be in competition with Amoco's, and it would be highly improbable that ICI would ask a firm so closely involved with the process to design its plant.

Moral Support: Assuming that ICI has licensed the Amoco process, it couldn't come at a more opportune time for either Amoco or Scientific Design. This process, of course, was behind Amoco's reduction of phthalic (and isophthalic) prices earlier this month *(CW Market Newsletter, Aug. 2)*. But because of Standard of California's trouble in starting up its isophthalic plant, and the difficulties that seem to be inherent in getting any new plant onstream, some in the industry have been skeptical about the Amoco process.

Final proof of the process, of course, must be a commercial plant, operating satisfactorily. In the meantime, however, both Scientific Design and Amoco can find comfort in the thought that a firm of the stature of ICI would have chosen to license the process.

For the rest of the industry, it could mean even more. Should ICI as well as Indiana Standard (Amoco's parent) show an interest in bromine activation of oxidation catalysts, there would be increased incentive—for industry and others—to find just what makes the process click. And that, in turn, could lead to better techniques for catalyst activation.

Dow: Up from the Dip

Though Dow Chemical Co.'s earnings for the past fiscal year took a disappointing dip (CW Business Newsletter, Aug. 16), President Leland Doan is optimistic about the long term.

In the company's latest report Doan opines that sales have "hit bottom" and will gradually improve from now on—although he emphasizes it will be a slow process.

The Dow chief executive explains that the company's four major divisions were operating at 60% to 75% of capacity during the fiscal year ended May 31. As a result there were significant cutbacks in the work force

and a hard squeeze on profits.

Capital Spending Peak: However, expansion spending hit a new high. Doan pegged capital additions at $185 million for the year. But the expansion budget for 1958-59 has been slashed to about $75 million, with spending to be "largely in those lines where markets are active."

Breaking down revenues according to product lines, the report discloses that chemicals accounted for 52% of over-all sales, plastics 35%, magnesium 7%, and agricultural chemicals 6%.

Chemicals, as a group, failed to match the previous year's record volume, though there were improvements in some lines. Plastics sales were up, but price reductions dragged profits lower. Magnesium sales were particularly hard-hit, off 33%. This was tied to the sudden drop in titanium production and cutbacks in military procurement earlier in the year.

Farm Chemicals Gain: One bright spot was agricultural chemicals, which gained over the preceding year. Weed, brush and grass killers accounted for more than one-half of the sales within this group. And total overseas sales were up, accounting for about 9% of Dow's 1957-58 sales.

But much of the basis for Doan's long-term optimism stems from confidence in the company's research program emphasizing development of new products and improvement of existing ones.

Among products singled out as highly promising were Separan, a new flocculating agent; Pelaspan, a newly developed polystyrene bead; Zefran, a new acrylic synthetic fiber; Trolene and Zoalene, animal health products. For several others still in the laboratory stages, and not yet named, Doan has high hopes, too.

New One for Nylon

Commercial Solvents Corp. unobtrusively hove into the fast-growing nylon industry last week. Sales Vice-President W. Ward Jackson says CSC's plant at Peoria, Ill., will be producing caprolactam—starting material for nylon-6 molding-type resin—in tank-car quantities by Dec. 1.

Initially at least, CSC's caprolactam plans call for limited volume but low-cost production. The operation will utilize:

- "A unique process developed by CSC research"—there will be no licensing or royalty fees to pay.
- Peoria plant equipment that's already in place and which otherwise would not be in use.
- Derivatives or by-products from current operations at the Peoria plant (which makes nitroparaffins, ethyl and butyl alcohols, and ethyl and butyl esters, as well as various feed supplements).

Industry Reaction: Jackson's announcement—with accompanying remarks on operating economies—brought cheers from companies that make moldings and other products from nylon-6, such as Foster Grant Co. (Leominster, Mass.). For them, CSC's new move means that there will be another (though limited) source of supply, and a step toward a buyers' market in the nylon monomer.

For producers and prospective producers of caprolactam, CSC's new project means more competition—but it also tends to endorse their forecast of an expanding market for high-quality molding resins *(CW, July 26, p. 23)*.

As of now, these companies say that their plans are unaffected by the CSC development. Du Pont completed a major expansion of its nylon plant at Parkersburg, W.Va., last year. Allied Chemical's National Aniline Division says it still intends to expand caprolactam capacity at Hopewell, Va., to 60 million lbs./year by early '59. And as to manufacturing costs, Allied says it, too, uses its own starting materials.

Not Unexpected: Ohio River Chemical Co.—jointly owned by Spencer Chemical and Industrial Rayon Corp.—says it was "well aware" at the time of its formation that CSC probably would be soon starting "small-scale production" of caprolactam. ORCC says that CSC's formal announcement "has in no way caused any alteration" of its schedule for construction of a 20-million-lbs./year plant near Ashland, Ky., by early in '60.

For CSC, entry into caprolactam production—preparations for which were started during '57—is another move toward greater reliance on petrochemical-based industrial chemicals. CSC officials have long been convinced that the firm's former dependence on fermentation products subjected its sales and earnings to the fluctuations of raw-materials markets.

Kudos for Competition

The synthetic rubber industry last week won warm—if not unmixed—praise for its competitive zest. Handing out the accolades was U.S. Attorney-General William Rogers, who presented to Senate Banking Committee the third annual "watchdog" report on competition within the industry.

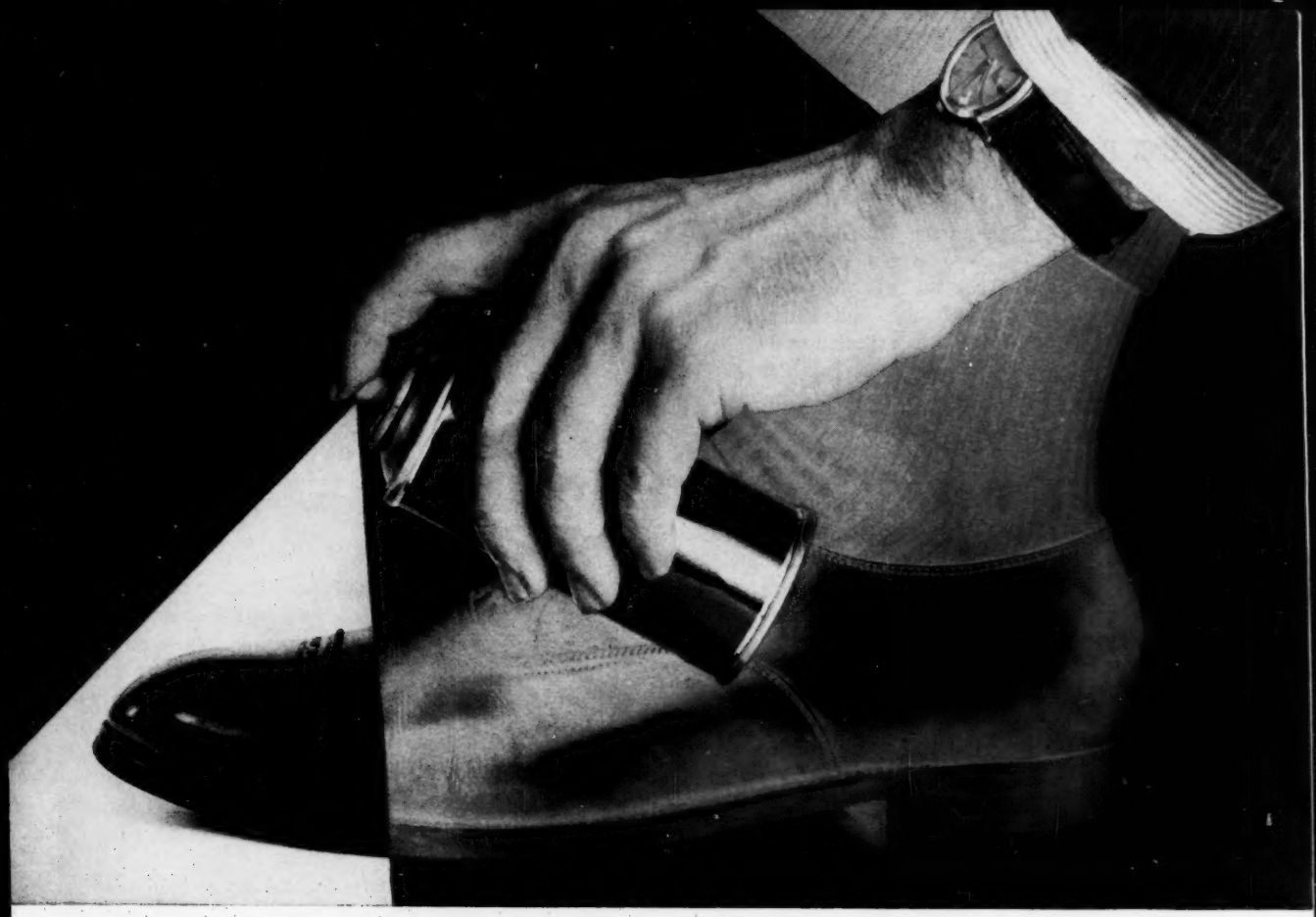
The appraisal, Rogers noted, is based solely on economic considerations, in no sense passes on the legality of the industry's practices during or since '57, the year covered. Nevertheless, it's sure to be welcomed by rubber producers, following as it does the government's charges against antibiotics makers *(CW, Aug. 9, p. 21; also see CW Report, p. 78)*.

Praise and Criticism: Last year, says the report, "saw some improvement in the status of competition within the synthetic rubber industry." Most significant:

- "Transition to a buyers' market" marked by "aggressive competition" among producers to hold old customers, win new ones among the nation's 1,200 or more fabricators. Evidence of this came from a nationwide FBI survey of 100 small fabricators. They were almost unanimous in describing increased technical service, greater variety and higher quality of synthetic rubbers, and generally greater supplier interest in fabricators' business problems.
- "Entry of new producers into the industry." Cases in point: General Tire & Rubber, Dewey and Almy (W. R. Grace), and International Latex Corp. started producing "S"-type general-purpose rubber; Texas Butadiene, Firestone, and Odessa Butadiene (early this year) brought styrene rubber plants onstream. None encountered any competitive obstacle in entering the field.

But Rogers did have some criticism. "Still of primary concern," he stated, "is the almost complete lack of price competition. There seems little excuse for continuing the price uniformity, born of government ownership, into a period marked by a buyers' market and in the face of a recent decline in the price of natural rubber."

However, the Justice Dept. reported, during all of '57 not a single consumer complained of inability to purchase supplies at fair prices.



Newest packaging idea in a $60,000,000 market

If you were out to gain a competitive advantage in the $60,000,000 shoe-polish market, you might do it with an aerosol.

Aerosol packaging has already revolutionized sales for hair fixatives, insecticides, shave creams, colognes and a host of other products.

Sales records and marketing data prove the appeal of aerosol packaging.

In a recent Du Pont survey, housewives who tried aerosol shoe polish preferred it 6 to 1 over any other form. The secret: aerosols deliver shoe polish in a completely new form—a form that's faster and easier to apply than shoe polish in conventional packages.

Put the unique advantages of aerosols to work for your products. Anything that's brushed, poured or sprayed might be packaged in an aerosol. It's surprisingly simple and inexpensive to have your formulation packaged for testing. Custom fillers near you have the knowledge and equipment to help you from planning through production.

If you don't know the name of a custom filler, write Du Pont. We'll send you a list and include survey data on your market for shoe polish plus information about Freon* propellents for aerosols. More of today's successful aerosols are powered with "Freon" than with any other propellent. Write E. I. du Pont de Nemours & Co. (Inc.), "Freon" Products Division 338, Wilmington 98, Del.

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EXPANSION

Natural Gas: Pan American Petroleum Corp. will build a "multimillion-dollar" natural gas processing plant near Riverton, Wyo., to treat 47 million cu.ft./day from the Beaver Creek oil field. Recovered products will include propane, butane and natural gasoline. Tuloma Gas Products Co. is expected to distribute the propane and butane. Both Tuloma and Pan American are subsidiaries of Standard Oil Co. of Indiana.

•

Cement: Louisville Cement Co. is embarked on a $3.5-million expansion program at its Speed, Ind., plant. Included are a $1.5-million kiln for fusing limestone and shale, and 12 new cement silos. They'll cost $2 million, will give the company a total of 42 silos, ranging in capacity from 8 to 42 bbls.

•

Engineering Building: Aerojet-General Nucleonics, subsidiary of Aerojet-General Corp., has broken ground for a new engineering building at San Ramon, Calif. The 24,000-sq.ft. structure, adjacent to existing office and manufacturing buildings, will be staffed with 160 people.

•

Oxygen, Nitrogen: Air Reduction Co. has broken ground for an oxygen and nitrogen plant in Kansas City, Kan., to serve industrial users within a 300-mile radius. Oxygen capacity: 5 million cu-ft./month. The new plant, due onstream in December, will replace Airco's present Kansas City, Mo., oxygen plant.

COMPANIES

St. Regis Paper Co. is offering a stock exchange to stockholders of Growers Container Corp., in which St. Regis already holds a 31% interest. The terms: one share of St. Regis common stock for 18 shares of Growers' outstanding capital stock. St. Regis seeks a total of 95% ownership of Growers, may settle for 80%. That would make Growers, with three plants in Florida and California, and '57 sales of $12.9 million, a division of St. Regis.

•

Thiokol Chemical Corp. will offer its stockholders a new issue of common stock this fall on the basis of one new share for each 12 held. Along with a long-term bond issue planned for later in the year, the capital will finance expansion for the Minuteman project (*CW, Aug. 2, p. 23*).

•

Catalin Corp. of America will make acrylic polymer emulsions and solutions for coatings and adhesives under a 10-year license agreement with Union Chimique Belge, S.A. (Brussels).

•

American Viscose Corp. will close its 35-million-lbs./year continuous fiber rayon plant in Roanoke, Va. Reason: demand for this sort of textile yarn, which the company makes at two other plants, has been falling. The Roanoke plant, built in 1917, cannot produce staple fiber or tire yarn, which are showing sales gains. First of the 1,750 employees will be furloughed during the next few weeks.

•

Vick Chemical Co. (New York) plans to acquire Lavoris Co. (Minneapolis), mouthwash producer. If stockholders approve at their Sept. 9 meeting, Vick will issue up to 196,492 shares of capital stock, exchange four shares for each seven shares of Lavoris. Effective date: Oct. 1.

FOREIGN

Chemicals/Italy: United States Rubber Co. and Rumianca Co. (Turin, Italy) will form a jointly owned (50-50%) company, Naugatuck-Rumianca, S.p.A., to produce and sell chemicals in Italy. The products, patented by U.S. Rubber's Naugatuck Chemical Division, include rubber accelerators and antioxidants, agricultural chemicals and chemical specialties. They'll be sold on an exclusive basis in Italy, nonexclusively in several other countries. Until the plant, near Turin, is operating, the new company will import its supplies.

•

Maleic Anhydride/Italy: Ftalital S.p.A. (Milan) will build a 2.2-million-lbs./year maleic anhydride plant—Italy's first—at Scanzorosciate (Bergamo). Scientific Design and its affiliate, Societe Francaise des Services Techniques S.a.r.l. (Paris), will provide engineering and technical liaison. Ftalital is Europe's leading producer of phthalic anhydride, the firm claims. It turns out 37.4 million lbs./year.

•

Carbide/Germany: Knapsack-Griesheim AG., subsidiary of Farbwerke Hoechst, plans to start up a 40,000-kw. carbide furnace this fall.

•

Sales/Germany: Farbenfabriken Bayer reports its '57 sales totaled $440.5 million, a 16% gain over '56. Exports accounted for 41% of total sales. The company reports $74.7-million capital expenditures (including $9.5 million for foreign facilities) and $19.6 million of expenditures on research and development.

•

Pharmaceuticals/Australia: Three U.S. firms are planning to expand their Australian operations.

- Warner-Lambert will build a 95,000-sq.ft., $1.2-million plant at Villawood to double its present capacity for pharmaceuticals, cosmetics, and other products.
- Abbott Laboratories is planning to build a plant at Sydney. Products: fine-chemicals, pharmaceuticals (but no fermentation products).
- Chas. Pfizer has purchased 10 acres near Sydney for a new plant to package and compound antibiotics, using basic material imported from the U.S.

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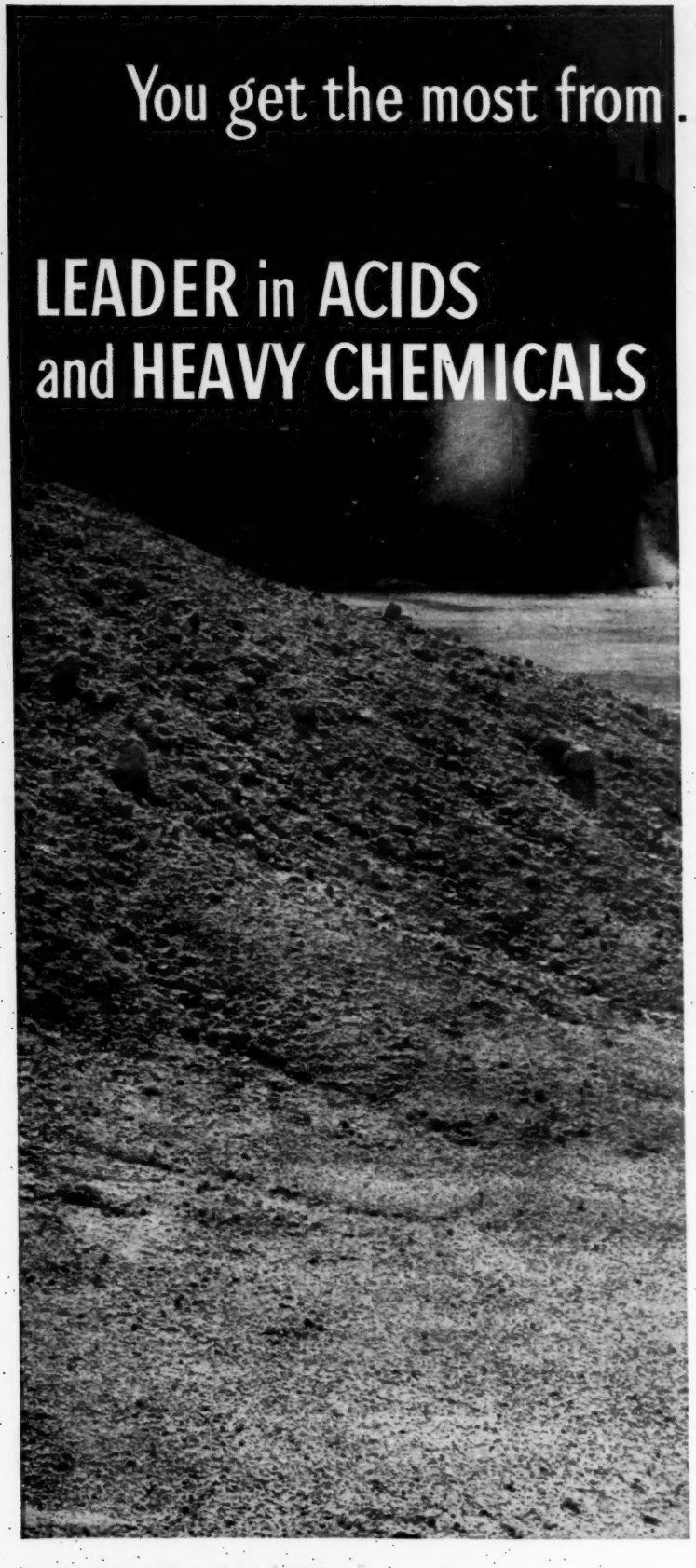

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Monsanto's broad line of acids and heavy chemicals is made up of *primary products*—not by-products! This means better chemicals . . . better processing for you.

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sulfuric	aluminum sulfate
oleum	sodium bisulfite
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chlorosulfonic	sodium sulfite
phosphoric	sodium sulfate
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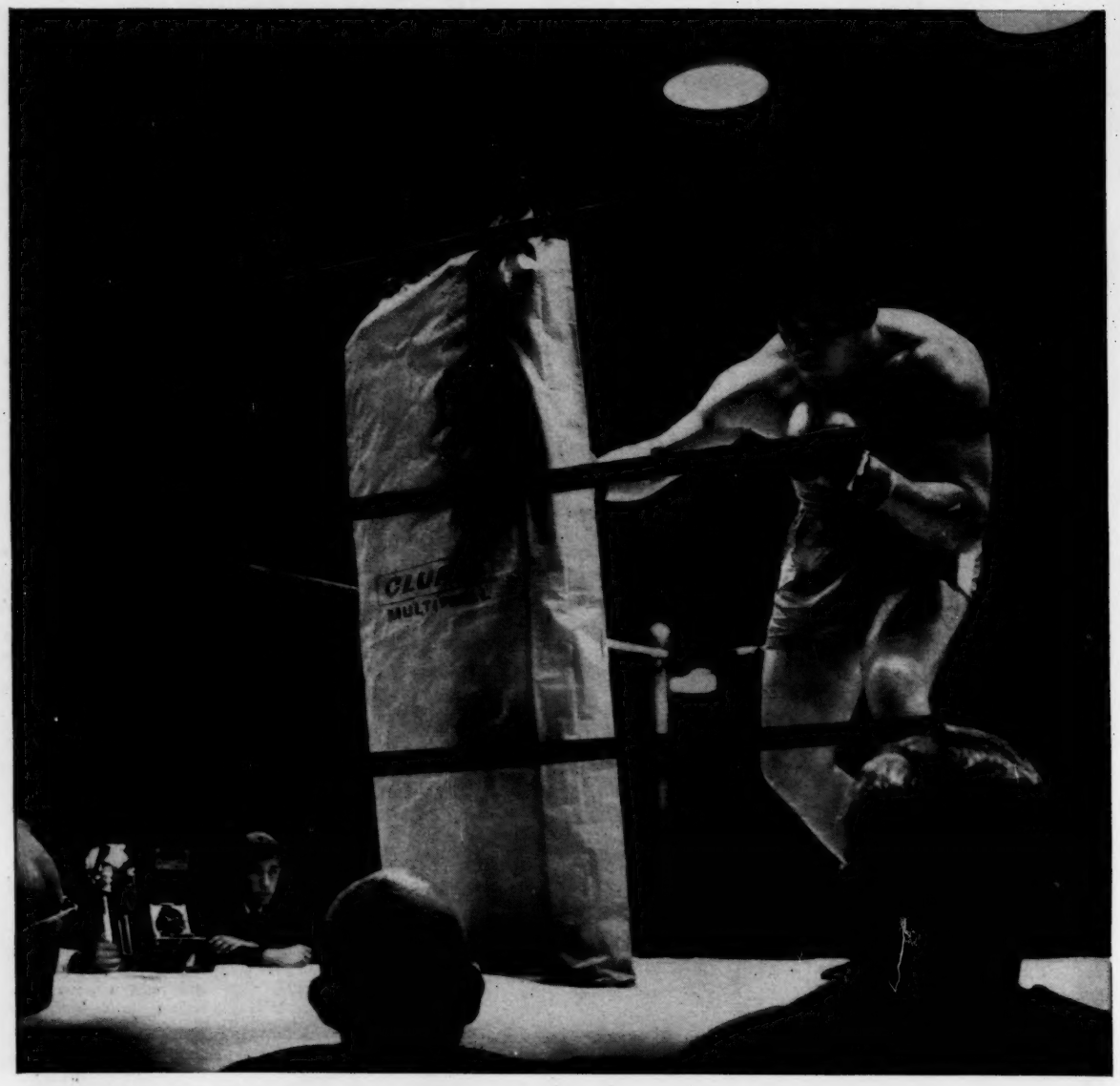

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Washington Newsletter

CHEMICAL WEEK
August 23, 1958

Congress has pried into many phases of chemical business and, on the eve of this session's adjournment, there's some significant legislation to report. A lot more was seriously looked into, but left over for Congress to consider again next year.

• Reciprocal trade law finally passed gave the protrade bloc a substantial victory; but there is to be no real tariff-cutting for four years, and higher-tariff advocates won some points, too.

• Antidumping law tightens controls on low-price foreign imports, which the Treasury says are being sold at less than fair value and Tariff Commission says may be injuring domestic firms.

• Renegotiation is being extended, but only to mid-'59. The House Ways & Means Committee will soon crank up for a study of industry's complaints that there's no more need for the law.

• Aid to small business was provided in creation of new agency to help finance a new system of capital banks to invest in and make long-term loans to small firms.

• Strategic materials in the stockpile will be upgraded with a $3-million appropriation.

• Defense minerals exploration agency is continued for a year with authority to subsidize projects to develop mineral reserves in the national interest.

• Defense Production Act was continued for two years. It authorizes (1) defense contractors' priorities on materials, (2) expansion of defense facilities, (3) stand-by controls.

• Defense reorganization puts more authority in hands of Secretary of Defense and joint chiefs, creates new head of defense research. But it won't change procurement operations.

• New space agency becomes top research and development authority on space—fuels, engines, space vehicles, scientific satellites.

• Tax rate on corporate income is continued at 52%; dropped were 3% transportation tax on freight, 4¢ on coal, 4.5% on oil by pipeline.

• Atomic energy. Congress voted a $396-million atomic facilities construction program, twice what the White House wanted. The Euratom program, under which U. S. companies will get government backing for a shot at the European market, also was approved. Along the way, key Democrats also managed to push Chairman Lewis Strauss of the Atomic Energy Commission into retirement.

• Industrial alcohol. Treasury authority to make emergency transfers and waive distilled spirits laws is extended two years.

Washington Newsletter

(Continued)

• Railroads given financial aid, more freedom from ICC rules.

• Minerals subsidies for copper, lead, zinc, acid-grade fluorspar and tungsten were caught up at last minute; outlook favored approval.

Unfinished business as Chemical Week went to press this week:

• Saline water bill provides $10 million for five demonstration plants, three for sea water, two for converting brackish water into fresh. House-Senate agreement still to come.

• Antitrust changes are dead—good-faith competition bill, pre-merger notification, authorization for "fair trade."

• Labeling hazardous articles got nowhere.

• Food additives control awaits only Senate action.

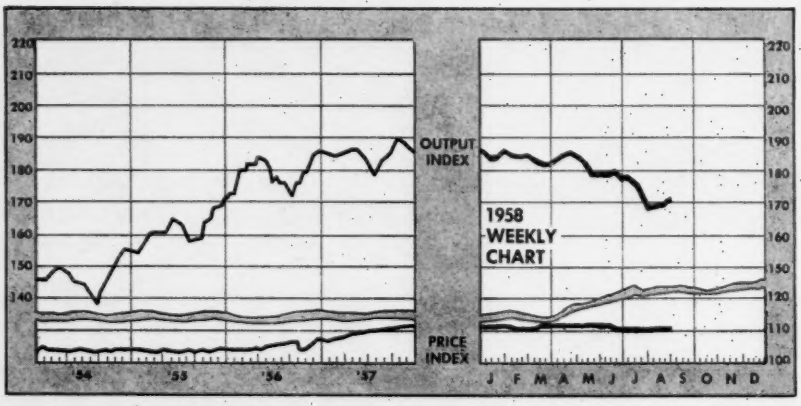
• Technical customs revisions got through House, not Senate.

• Alien property legislation didn't move.

• Labor legislation tied in knots early this week.

• Patents appeals to Commissioner of Patents would be eliminated by bill passed by House, would create new board to issue decisions that could be appealed directly to courts.

• Investigators in Congress pried, among other things, into antibiotics pricing, cigaret filters, weight reducers and tranquilizers.



Business Indicators

WEEKLY	Latest Week	Preceding Week	Year Ago
Chemical Week output index (1947-49=100)	171.5	170.0	181.0
Chemical Week wholesale price index (1947=100)	110.6	110.7	110.8
Stock price index of 11 chemical companies (Standard & Poor's Corp.)	44.43	44.18	43.78

MONTHLY Trade (million dollars)	Manufacturers' Sales: Latest Month	Manufacturers' Sales: Preceding Month	Manufacturers' Sales: Year Ago	Manufacturers' Inventories: Latest Month	Manufacturers' Inventories: Preceding Month	Manufacturers' Inventories: Year Ago
All manufacturing	25,705	25,206	28,442	50,322	50,896	53,853
Chemicals and allied products	1,918	1,875	1,894	3,742	3,796	3,692
Petroleum and coal products	2,664	2,657	2,780	3,345	3,377	3,486

ADVERTISEMENT—*This entire page is a paid advertisement* *Prepared by U. S. Industrial Chemicals Co.*

U.S.I. CHEMICAL NEWS

August 23 ★ A Series for Chemists and Executives of the Solvents and Chemical Consuming Industries ★ 1958

Historical Study Indicates That Chemist Creates Most Between Ages 30 and 34

A recent study of 2,500 of the world's ablest chemists, now deceased, reveals that collectively these men did most of their important creative work between the ages of 30 and 34. Dr. Harvey C. Lehman of Ohio University, in reporting his findings in the May issue of Science magazine, says "The more brilliant the chemist, the earlier the age at which he gives genuine indications of his future greatness." " . . . after he has passed his thirties, the production rate for the most brilliant chemist's extremely important creative work tends to fall off both earlier and more rapidly than does the production rate for his own less brilliant output."

Dr. Lehman's data is drawn from 44 histories of chemistry written by German, French, American, English and Italian authors.

Plan ACS Subdivision of Organometallic Chemistry

At the American Chemical Society meeting in San Francisco this past April, the Division of Inorganic Chemistry proposed that a Subdivision of Organometallic Chemistry be set up. Action was deferred due to the newness of the Division itself, but interest continues high and indications are that the Subdivision will be formed within the next few years.

In the meantime, a day-long organometallic symposium will be sponsored by the Cincinnati ACS section on October 29, and a second Symposium on Organometallic Chemistry has been planned for the April 1959 ACS Meeting in Boston. It is felt that the field is growing rapidly enough to warrant *consistent* presentation of papers on organometallics — compounds having metal to carbon bonds.

Probably the oldest and best known organometallic compounds are the Grignard rea-

MORE

Glass Fibers Improve Compression Properties Of Polyurethane Foams

Studies now being conducted by a glass fiber producer and a supplier of urethane foam raw materials indicate that addition of 5% by weight of fiber to foam increases compression set, compressive strength and resilience. Also, per cent elongation is reduced — all without affecting density, porosity or resistance to humidity aging.

In these experiments, polyester-type urethane foams have been combined with glass fibers of various sizes to give varying results. It has been found that in cushioning, for example, ⅛-inch fibers eliminate "plateau" and cut hysteresis loss, while increasing compressive strength from 0.46 to 0.68 psi. For shock absorbers, 1/32-inch fibers give high hysteresis loss, high compressive strength and low per cent elongation.

CPI Helps Its Own Baby Grow

Employs More and More Polyethylene for Equipment, Packaging and Protection; Finds Toughness, Corrosion Resistance, Moisture Barrier Properties Most Valuable

One of chemistry's own products — polyethylene — is changing chemical shipping habits, cutting laboratory hazards and reducing plant maintenance headaches. With plenty of the plastic available — production reached 630 million pounds in 1957—engineers in the Chemical Process Industries are becoming polyethylene-minded. They are continually looking for, finding and developing new uses for this tough, corrosion-resistant, inexpensive resin within the industry.

Shipping Chemicals in Polyethylene

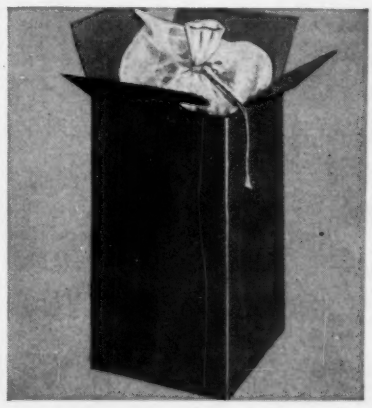
Chemical manufacturers are packing and shipping both solids and liquids in a wide variety of polyethylene packs and polyethylene-lined and coated containers. Combinations of flexible bag and cardboard box, for example, are being used to transport fluids from producer to chemical consumer — without losing a drop. Even polyethylene is shipped in polyethylene-coated bags. Increasing utilization of the resin is based on its moisture barrier characteristics, corrosion resistance, toughness, nonbreakable properties, light weight and low cost.

The government gave its blessing early in 1955, when the Interstate Commerce Commission approved shipment of nonregulated chemicals by road and rail in molded polyethylene drums. Last year these drums were OKed by the ICC for regulated products such as alcohols, acids and other corrosive liquids, sodium chlorite solutions and hypochlorite solutions.

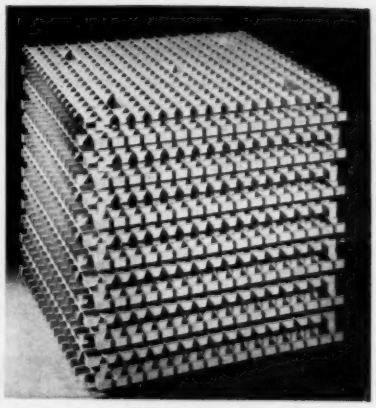
Processing and Laboratory Equipment

A glance through any catalog of laboratory ware these days reveals that polyethylene is replacing glass wherever possible, to cut down on breakage. And for corrosive service, the chemist can now obtain items such as valves, pumps, sink traps and blade stirrers molded of polyethylene. Among the most recent developments in laboratory equipment is the polyethylene fume hood, including stacks, fans

MORE



Package for liquid chemicals combines pinhole-free polyethylene bag and corrugated box.



Polyethylene grid packings for water cooling towers. (Photo courtesy Fluor Products)

Extra-wide polyethylene film can serve as a temporary protective cover for materials or equipment.

CONTINUED

Polyethylene

and fittings. Here a service life of at least 20 years is expected from the resin.

More and more, polyethylene is showing up in the chemical plant in process equipment for corrosion resistance. One chemical plant is using polyethylene pipe to carry brine between two processing units, and steel pipe coated on the outside with polyethylene has been developed for underground use.

Polyethylene has been bonded to steel as a lining for storage tanks, piping, tank cars, process vessels and tank trucks. It has been woven into filter cloths, molded into waste and drainage systems, pump bodies, cooling tower grids and packings.

Polyethylene Film Gives Protection

Lengths of heavy-gauge, extra-wide polyethylene film are being employed in the chemical industry for all sorts of temporary situations and emergency problems. They are protecting equipment and bulk raw materials against dust and moisture in storage or transit, keeping personnel warm and dry during open air operations, providing temporary shelter after explosion or fire, lining ordinary vessels temporarily for corrosive service.

And the end is not yet in sight. Polyethylene producers are working constantly with engineers to use the resin's valuable properties more fully in the industry of its origin.

CONTINUED

Organo-Metallics

gents (organomagnesium halides) and tetraethyl lead. Recently, complexes of aluminum, boron, tin, manganese and other metals have become important as catalysts, intermediates, additives and end products in plastics and resin manufacture, the jet aircraft field and a host of other industries.

Organosodium compounds are being used as an economic route to other organometallics. Prepared from alkyl or aryl halides and finely dispersed sodium, the organosodium compounds are reacted with metal halides or alkoxides to yield otherwise hard-to-make Grignards, and valuable compounds such as lithium alkyls, dibutyl aluminum chloride, triphenyl boron and dibutyl tin.

Plant Demonstrates Ideal Handling of Bulk Sodium

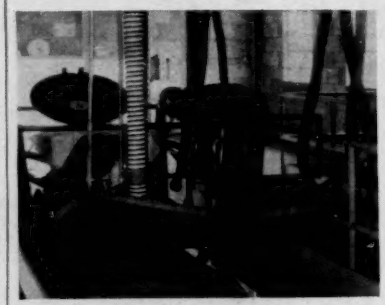
A model installation for receiving, pumping, filtering and storing tankcar quantities of sodium is now in operation at the zirconium plant of Mallory-Sharon Metals, Ashtabula, O.

This installation is designed to transfer two million pounds a year of metallic sodium — in 80,000-pound chunks — from tankcar to storage to process without contaminating the metal or bringing it into contact with any outside material. Here's how it works!

The railroad car, containing solid sodium under argon, is run into a receiving shed about 50 feet from the process building. Adjoining the shed are areas for oil storage, heating and pumping; sodium pumping, filtering and storage; and argon gas handling. Lines for argon, heating oil and molten metal connect the shed to these areas. The lines are attached to the car.

Hot oil is pumped to the tankcar heating coils, melts the sodium and heats it to 250°F. Argon is forced into the car to push the molten metal up into the sodium line, from which it is pumped electromagnetically through filters to storage. Complete instrumentation assures constant control of all variables.

The installation incorporates the most advanced techniques of sodium handling developed over the years by U.S.I. To help others working with large quantities of sodium, U.S.I. offers a booklet "Handling Metallic Sodium on a Plant Scale."



View of top of tankcar in shed shows connections for sodium, heating oil, argon. Sodium lines are heated via A.C. induction coils.

TECHNICAL DEVELOPMENTS

Information about manufacturers of these items may be obtained by writing U.S.I.

Isophthaloyl and terephthaloyl chlorides of 98% minimum purity are now in pilot plant production. Suggested as raw materials for fibers, films, protective coatings. Claimed to have greater reactivity than corresponding acids. **No. 1380**

Uses of permanent, non-electric magnetism in modern materials handling and magnetic separation equipment described in new, 48-page, free booklet. Covers chemical, plastics, food, ceramics, textile, paper fields among others. **No. 1381**

New adhesive for bonding polyethylene linings to steel tanks and other surfaces is a one-part, self-vulcanizing material. Need for primers on metal or plastic is eliminated. Bonds are temperature-stable, remain flexible. **No. 1382**

Microfilm storage is the subject of a new American Standard, drawn up for the purpose of protecting microfilm against humidity, temperature, dust and gas. Inspection methods are included. Copies can be purchased. **No. 1383**

Ethyl-di-n-propylthiolcarbamate, a selective herbicide for most grassy weeds, has just been registered by the Dept. of Agriculture for use with crops such as beets, flax, corn, beans. Limited quantities are being offered for sale. **No. 1384**

Three new synthetic polysulfide rubber caulking compounds are available which are said to have 400 to 500% elongation, excellent weathering, water resistance, flexibility. Can be used on metals, wood, clay products, glass. **No. 1385**

Proceedings of the 1957 Conference on Precautionary Labeling have now been published as a 52 page book which can be purchased. Includes all papers presented plus a list of those who attended. **No. 1386**

Glycol di-mercaptoacetate, a new dithiol just introduced, can act as a cross-linking agent and monomer for special polymerizations by addition across ethylenic unsaturation, and by reaction with active halogen. **No. 1387**

New non-flammable, cold solvent stripper for epoxy enamel coatings is designed for many of the newer epoxies usually very difficult to remove. Coatings are rapidly wrinkled and detached from base metal, rather than dissolved. **No. 1388**

Special 99% pure cetyl alcohol is now on the market which is claimed to meet or exceed the high standards of the Toilet Goods Association. Lead content is said to be 1 ppm max., arsenic content 1 ppm max. as As_2O_3. **No. 1389**

PRODUCTS OF U.S.I.

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PETROTHENE® 200 Series — high quality resins for extrusion, injection and compression molding, film extrusion, paper coating, blow molding.

PETROTHENE 300 Series — special resins for electrical insulation use.

PETROTHENE 560 Series — black, compounded resins for pipe and mulch-film extrusion.

OTHER PRODUCTS

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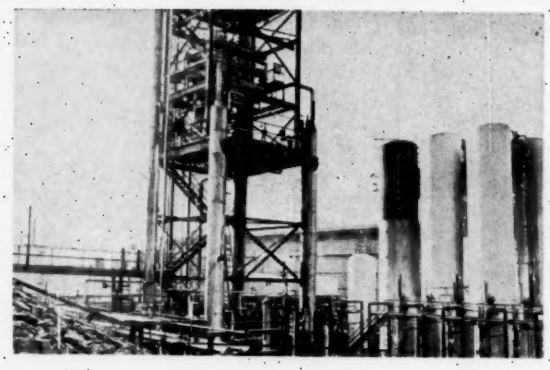
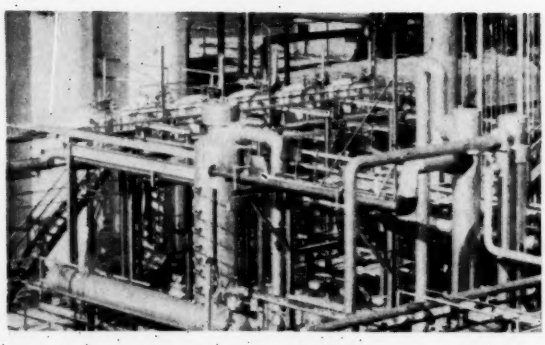
ALERT ENGINEERING OF NEW METHYLAMINES PLANT . . .



Saved 50% on capital costs by reducing its requirements for major items of processing equipment.

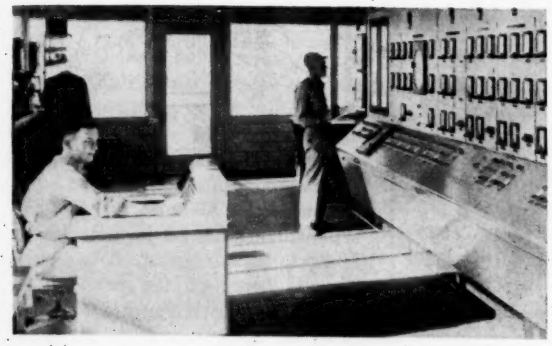
Saved space, structural steel and piping by using distillation columns to support auxiliary equipment.

Saved 40% on engineering costs, 10-15% on construction costs by doing its own detailed engineering, local contracting.



Saved on construction and maintenance costs and yield losses by welding all joints, eliminating flanges and bolts.

Saved product by recycling temporarily unwanted constituent instead of burning it, thus shifting process equilibrium in favor of desired product.



Saved $90,000 by using nonexplosionproof equipment, placed in air-conditioned control building.

Saved $20,000/year by centralizing supervision, analysis, shipping, controls for operation and blending.

How CSC Saves in Making Methylamines

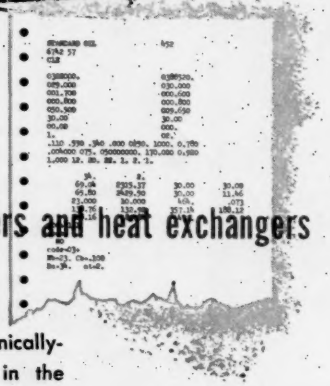
This week, Commercial Solvents Corp. is revealing for the first time the cost-saving secrets of its novel Terre Haute, Ind., methylamines plant.

The CSC unit, completed late last year and now in full production, is the first new plant for these products built in the U.S. in the last 11 years. In showing it off, CSC provides a rare opportunity to study an American methylamines unit, this one based on a process design by J. D. Leonard & Associates (New York). Other producers, Rohm & Haas and Du Pont, have never provided much information about their facilities.

And although CSC will not give specific figures on the capacity or cost of the plant, it does rate capacity "in excess of 5 million lbs. year," says that total cost, including laboratory and other auxiliary facilities, is about $2 million.

Japanese Guide: In choosing Leonard's design, CSC had a commercial model to help guide its decision. This was a similar, but smaller, plant designed by Leonard for Nitto Chemical Industries at Yokohama, Japan.

the moment of truth...

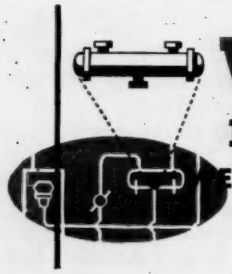


. . . about electronic computers and heat exchangers

Nobody disputes the accuracy of electronically-computed findings or calculations, but in the solution of heat transfer problems, the electronic computer performs only one of several important steps.

At the core of Western's reputation for designing and building heat exchangers of true quality and long-life efficiency, is the step that follows our electronic computations: the precise and pertinent interpretation of these findings in the light of our engineers' combined experience in the heat transfer field, as well as an intimate knowledge of each customer's needs.

The results of electronic wizardry are valuable only if you know how to use them.



WESTERN

HEAT EXCHANGERS

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Originally designed to produce 1 million lbs. of methylamines annually, the Nitto unit is a batch plant that can be converted to continuous operation. The plant has been so successful since startup over four years ago that two batch columns have been added to the original one, and conversion to continuous operation is scheduled for next year.

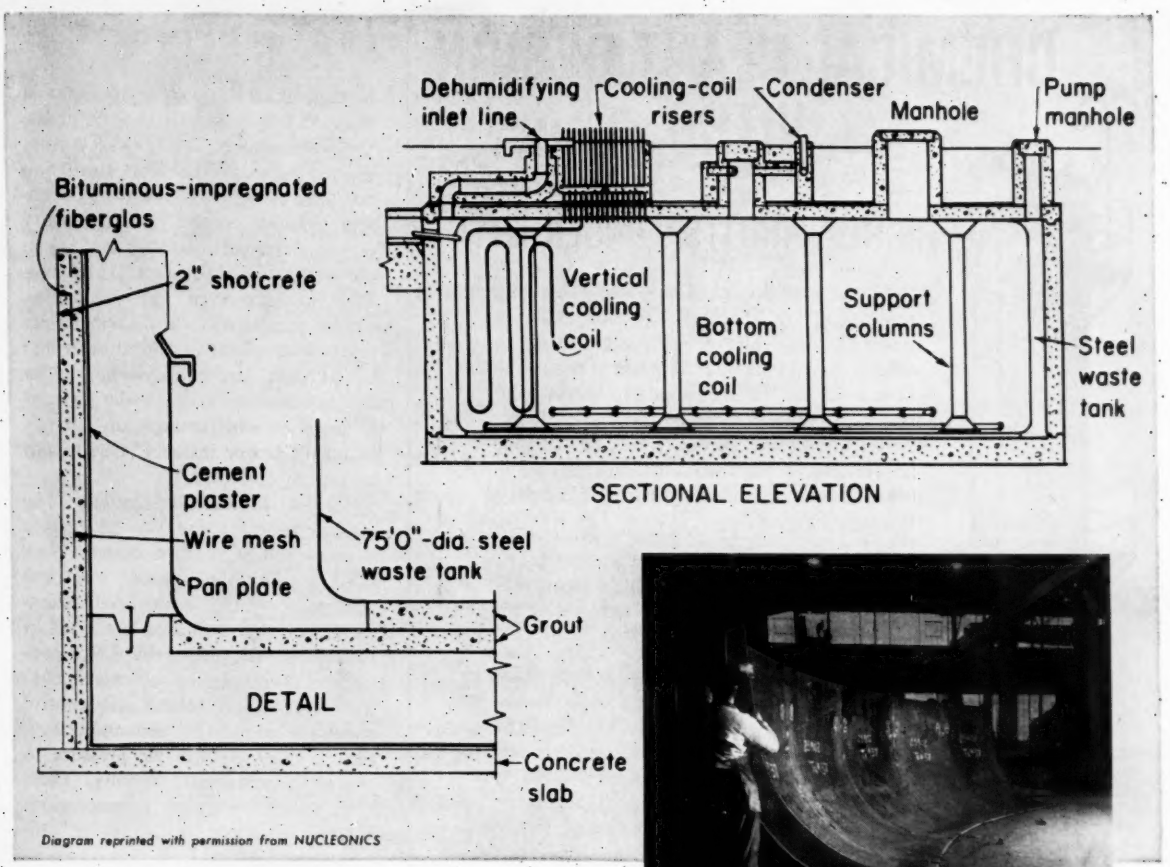
Leonard, relying on its experience with the Japanese and other similar projects, has come up with the estimates of CSC savings summarized on page 33. For instance, CSC bypassed the conventional "turnkey" contract, thus saved an estimated 40% on engineering costs by doing its own detailed engineering, 10-15% on construction costs by being its own general contractor, subletting work to local contractors.

Savings by Design: Two design features that Leonard credits with essential savings are the reduction in the number of major pieces of process equipment and the ability to recycle unwanted product. CSC's four distillation columns are about half the number reportedly used in other methylamines plants, account for an estimated capital saving of about 50%.

The recycling feature is valuable since the reaction yields all three products (mono-, di- and trimethylamine) simultaneously. If one or two of them should be in low demand, they can be recycled rather than burned off. Since they are then introduced into the feed mixture, further production of them is held down by the equilibrium of the reaction, and the desired amine is preferentially produced.

Corrosion Inhibitors: The fact that the methylamines act as corrosion inhibitors led to other dollar-saving features based on the premise that dismantling the equipment would never be necessary. First, all costly flanged pipe was eliminated, replaced by welded joints. The cost of welding the joints ranged up to several dollars per joint below that of buying and installing flanged pipe, according to Leonard. And the leakproof welded joints provide a threefold advantage for CSC:

- Maintenance is eliminated.
- Yields are raised to 97-98% (said to be 5-10% above that of other producers).
- A community relations problem is avoided by keeping the odor of the



One AEC Solution To Radioactive Waste Storage

Storing radioactive wastes underground in huge 750,000 gallon double-bottomed steel tanks, as shown above, is one solution to the waste disposal problem at the AEC installations at Savannah River, S. C. and Hanford, Wash. Internal cooling coils take away the heat generated by radioactive decay. Remote handling protects personnel from high activity levels.

Graver has fabricated and erected sixty-eight such waste storage tanks for these nuclear installations. Special fabricating methods and field-erection techniques were required. For example, shop fit-up of the curved bottom plates expedited field assembly of the tanks.

The century-long experience of Graver in fabricating steels and alloys for a huge variety of processing equipment, pressure vessels and storage tanks admirably qualifies it to build for the future with America's important nuclear industry.

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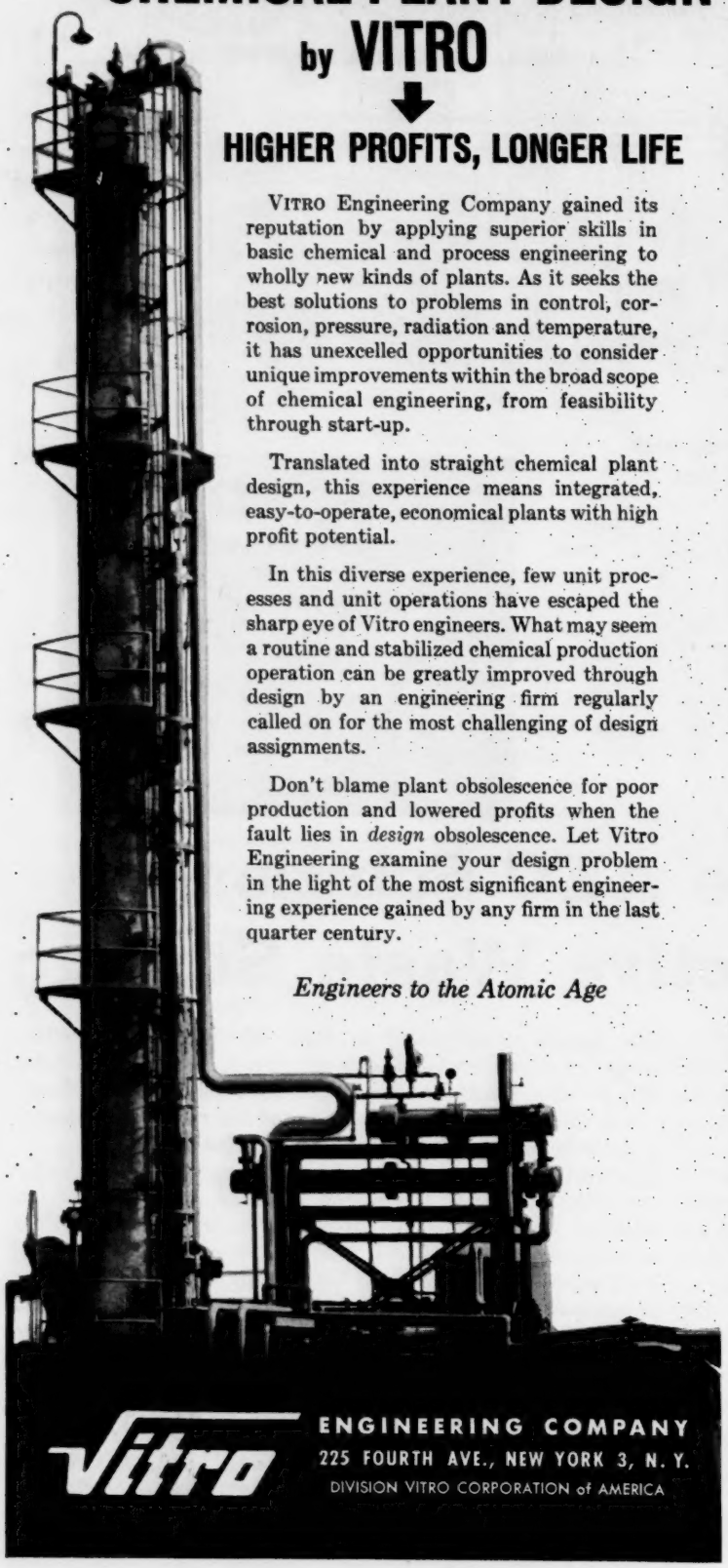
In this diverse experience, few unit processes and unit operations have escaped the sharp eye of Vitro engineers. What may seem a routine and stabilized chemical production operation can be greatly improved through design by an engineering firm regularly called on for the most challenging of design assignments.

Don't blame plant obsolescence for poor production and lowered profits when the fault lies in *design* obsolescence. Let Vitro Engineering examine your design problem in the light of the most significant engineering experience gained by any firm in the last quarter century.

Engineers to the Atomic Age



Vitro ENGINEERING COMPANY
225 FOURTH AVE., NEW YORK 3, N. Y.
DIVISION VITRO CORPORATION of AMERICA

methylamines—said to be like that of decayed fish—out of the atmosphere.

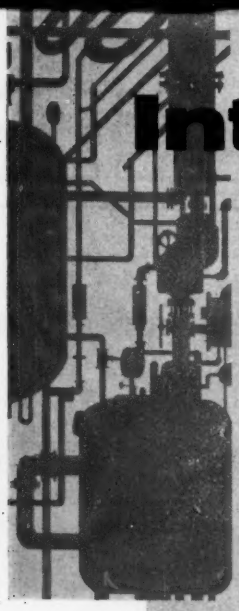
Another novel saving was accomplished by using the four distillation columns as supports for the condensers, reboilers, control valves, auxiliary piping and steel platforms needed in the separation operation. (The columns do not even have manholes, cannot be entered.) Thus, savings were realized in space, structural steel and piping runs. Leonard's confidence in the noncorrosiveness of the process is based on experience with columns that have operated for 15 years with no sign of corrosion.

Control Room Cost-Cutting: The control room is the site of further savings in CSC's plant design. Normally, explosionproof electrical equipment would have been necessary, since the plant area is classed as hazardous. However, the CSC control room—including electrical controls and wiring behind the control panel—is completely air-conditioned, with a slight positive air pressure to prevent fumes from entering. Thus, CSC was able to use nonexplosionproof gear, chalk up a saving estimated at $90,000. In addition, smoking is permitted, which eliminates time-consuming "smoke breaks" by the operators.

And the high degree of automatic control in the plant results in lowered costs through centralization of supervision, in-process analyses, shipping, and control of synthesis, blending and filling operations. The manhours saved by handling all these functions in one location are estimated to be worth more than $20,000/year by the Leonard staff.

Incentive to Save: Because of the wide variety of uses* for methylamines—particularly the potentially large demand for dimethylamine as a starting material for missile fuel unsymmetrical dimethylhydrazine (*CW, Nov. 6, '54, p. 36*)—more firms may consider building competitive methylamines plants. Based on CSC's experience, newcomers can't afford to overlook any possibilities in cutting costs.

*Monomethylamine: surface-active agents, photographic developers, drugs, dyes, explosives, herbicides and insecticides. Dimethylamine: antihistamines, detergents, depilatories, fungicides, herbicides, rubber accelerators, ion-exchange resins, dimethylformamide, dimethylacetamide, dimethylamine boranes (under development). Trimethylamine: drug products (including choline), herbicides, corrosion inhibitors, missile fuels, trimethyl borane (last two under development).



Intermediates

ACETALDEHYDE AMMONIA
ACETOPHENONE
ACETYL CHLORIDE
ANISIC ALDEHYDE
ANISYL ACETONE
ANISYL ALCOHOL TECH.
ANISYL CHLORIDE
ANISYL CYANIDE
AZELAOYL CHLORIDE
BENZALACETOPHENONE
BENZHYDROL
BENZHYRYLAMINE
BENZHYDRYL CHLORIDE
BENZOPHENONE TECH.
BENZYL ALCOHOL TECH.
BENZYL CYANIDE
BUTYROYL CHLORIDE
n-CAPROIC ACID
CAPROYL CHLORIDE
CAPRYLOYL CHLORIDE
p-CHLORBENZOPHENONE
p-CHLORBENZHYDROL
p-CHLORBENZHYDRYL CHLORIDE
p-CHLORBENZYL CYANIDE
CINNAMOYL CHLORIDE
DIBENZYL ETHER
DICYCLOHEXYL CARBINOL
DICYCLOHEXYL KETONE
p,p'-DIMETHOXYBENZOPHENONE
DIPHENYL ACETONE (unsym)
DIPHENYL METHANE
ETHYL FORMATE TECH.
ETHYL PHENYLACETATE
beta IONONE
ISOBUTYROYL CHLORIDE
ISOVALERIC ACID
LAUROYL CHLORIDE
p-METHOXY PHENYLACETIC ACID
METHYL HEPTENONE
METHYL PHENYLACETATE
MYRISTOYL CHLORIDE
OLEOYL CHLORIDE
PALMITOYL CHLORIDE
PHENYLACETIC ACID
PHENYLACETONE
PHENYLACETYL CHLORIDE
PHENYL PROPYL ALCOHOL
PHENYL PROPYL CHLORIDE
POTASSIUM PHENYLACETATE
PROPIONYL CHLORIDE
PROPIOPHENONE
SEBACOYL CHLORIDE
SODIUM PHENYLACETATE
STEAROYL CHLORIDE
n-VALERIC ACID
And Other Intermediates

The TRUBEK LABORATORIES

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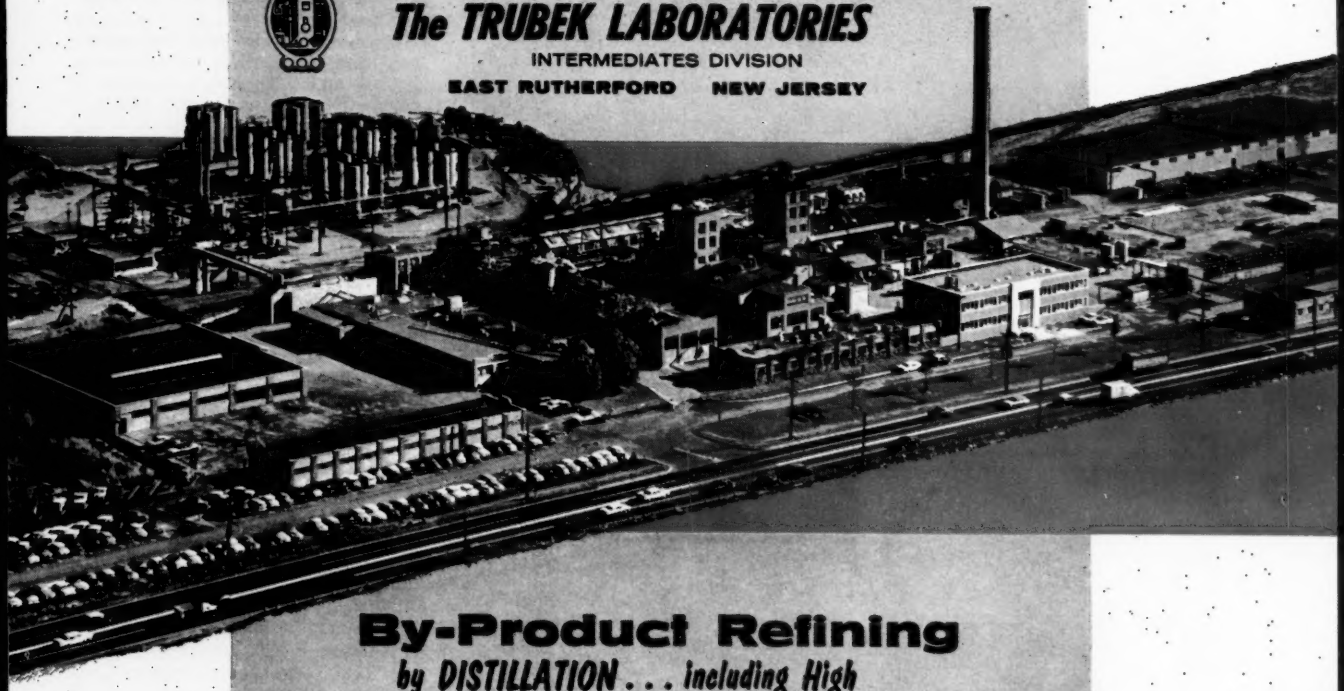

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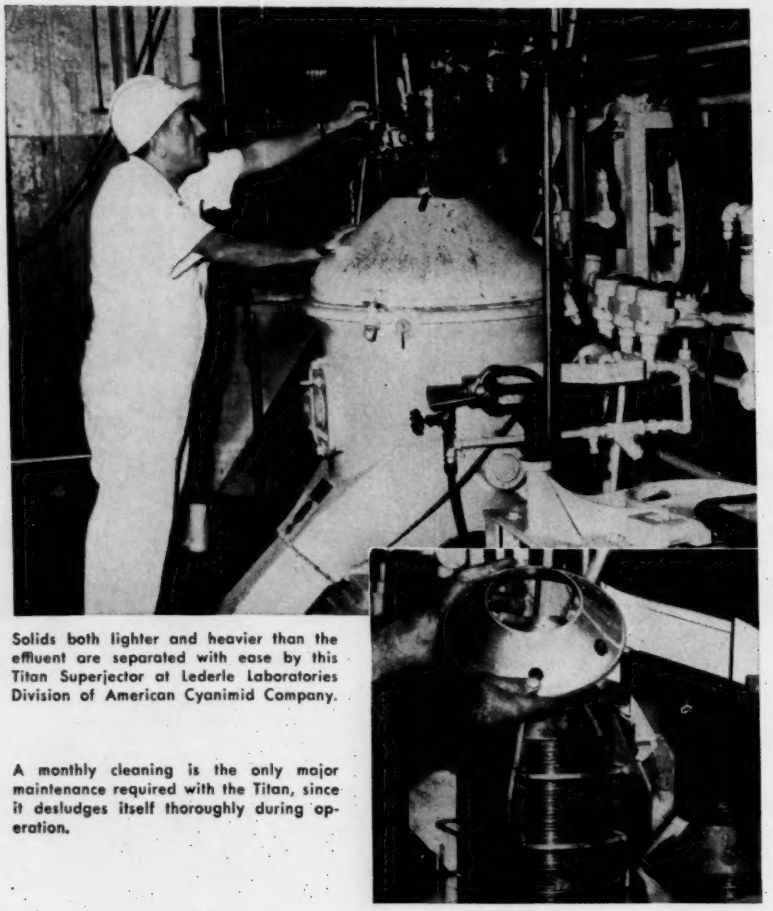
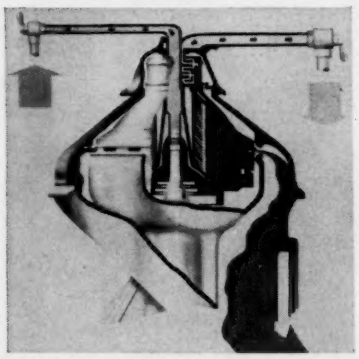
PFAUDLER

Lederle Labs up enzyme production 140% with Titan Superjector

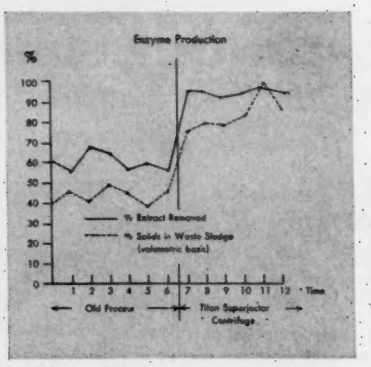


Solids both lighter and heavier than the effluent are separated with ease by this Titan Superjector at Lederle Laboratories Division of American Cyanimid Company.

A monthly cleaning is the only major maintenance required with the Titan, since it desludges itself thoroughly during operation.



Desludging action on both light and heavy solids is shown in this cross-section of the Titan Superjector. Desludging is automatic and can be set to any time cycle desired.



Enzyme production shot up dramatically immediately after Lederle Laboratories began using the Titan Superjector. Notice the high percentage of enzyme separation.

Problem one

To get a certain enzyme, Lederle Laboratories have to pull it out of a slurry that runs 15% to 50% solids.

Problem two

The clogging problem presented by this thick slurry is aggravated by the presence of solids both lighter and heavier than the enzyme liquid.

Solution

What to do? After careful study, Lederle engineers settled on the Titan Superjector whose special disc design and method of desludging achieve the most difficult separations with ease.

The liquid feeds down the center of the Titan and out at the lower edge of the center tube so that it enters the disc stack from the bottom.

It then rises through aligned holes in the discs. Separation starts at the holes and is intensified by particle contact with the disc bottoms.

The Titan's action forces the liquid enzyme up to the top of the bowl where it is decanted continuously. Solids lighter than the liquid get trapped at the center of the bowl. Heavier solids slide to the periphery where they are collected by settling vanes.

Slots around the outside of the bowl, ⅜" high by 5" long, open automatically to pre-set cycles and desludge both types of solids in a span of seconds.

The Titan keeps running during desludging so there is minimal loss of production time.

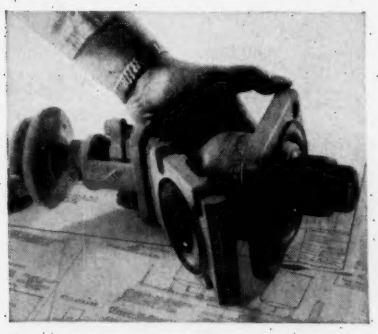
Result

Since installing the Titan, Lederle Labs have boosted enzyme output from 25 to 60 gph—a phenomenal increase of 140%. See graph at left. Sludge now goes directly into the plant's sewage system and causes no problem whatsoever. Maintenance consists of routine lubrication and a monthly clean-out.

How about you?

If you have a difficult separation problem, you'll surely want to know more about this machine. With it you can separate solids from one or even two liquids at speeds up to 6000 gph, exerting up to 7800 G's. Just check the coupon for a bulletin.

CORROSIONEERING NEWS



New glassed flush valve

. . . . available on O. E. M. discounts

Head and stem on this new valve are one piece and glassed. The seat is rigidized Teflon-glass fiber and its bevel mates with that of the spherical shaped head. The Teflon has some "give" so you can get a firm seating without danger of damaging the head.

This design is interchangeable with existing valves you might now be using and costs no more than a conventional stainless steel valve. Sizes range from 1½ by 1 to 8 by 6.

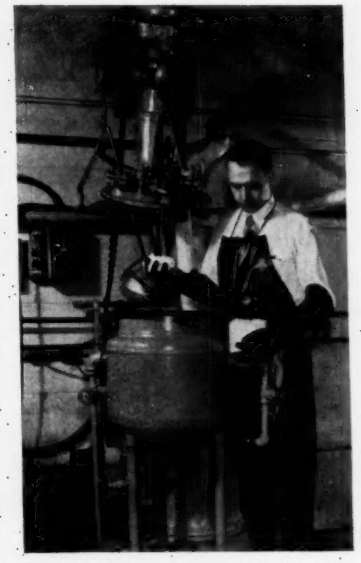
Check coupon for more data.

Protect manholes with this new plastic chute when you dump a charge.

Pfaudler glassed steel takes a lot of abuse, but this chute offers still further insurance against damage to the manhole flange when you dump abrasive or solid materials. This inexpensive chute slips onto the flange easily and protects the entire neck of the opening. Check the coupon for Data Sheet 43 for more details.

Chlorine dioxide and glassed steel

Chlorine dioxide is much in the news since various methods have been devised for safely generating and taming this highly corrosive and explosive oxidizing agent.



The Mead Corporation uses this 10-gallon glassed-steel Pfaudler reactor in its continuing study of chlorine dioxide as a pulp bleaching agent. Two years of work with solutions ranging from eight to twenty grams of chlorine dioxide per liter have left the glassed steel unmarred.

Our own experience with chlorine dioxide, going back some years now, has reached the point where our engineering can size and equip a complete generating plant using the process of your choice.

Our interest here is natural, since the making of chlorine dioxide involves a host of other corrosives, among them sulfuric acid, sulfur dioxide, methanol, and sodium chlorate.

Glassed steel invariably proves the most practical and economical material for handling all these corrosives.

In the typical chlorine dioxide installation, you will find glassed steel at work in sodium chlorate and sulfuric acid storage tanks, generators, columns, waste liquor storage tanks, chlorine dioxide storage tanks, and in pipe, fittings, valves and pumps.

We are familiar with all the generating systems in common usage and work closely with the licensors to save customers as much as possible from the detail work of putting a system to work.

If you have thought of using chlorine dioxide for pulp bleaching, or water treatment or the bleaching of fats, oils, flour, etc. you will benefit from investigating further the use of glassed steel.

CHEMICAL EQUIPMENT by PFAUDLER

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Please send me ☐ Bulletin 946, Titan Superjector; ☐ Data Sheet DS-42, Flush Outlet Valve; ☐ Data Sheet 43, Dump Chute; ☐ Bulletin 968, New Buyer's Guide

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See Chemical Engineering Catalog, pp. 1407-1418 for complete Pfaudler line.

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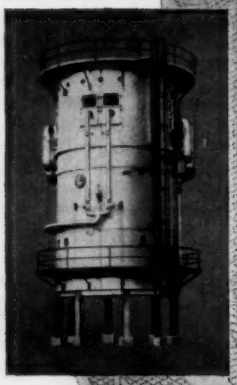

Since its introduction ten years ago, the Chemico *gas reform furnace* has often proved the most efficient and economical first step in the production of ammonia, methanol and high purity hydrogen from natural gas. The unique design of the Chemico *gas reform furnace* eliminates thermal expansion problems, assures easy control during operation and requires minimum maintenance.

Now there are more than 60 furnaces in operation, and another 10 are in the design or construction stage. These units range in capacity from 50,000 to 8,000,000 standard cubic feet per day of hydrogen plus carbon monoxide. For any process which requires hydrogen, the Chemico *gas reform furnace* may well prove the most economical means of obtaining the necessary quantities. Write to Chemico for further information.

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Halocarbon's Ehrenfeld: His aim is to scatter the eggs from their all-in-one-basket arrangement.

Seeking a Divorce from a Single Market

Late this summer, the first manned U.S. spacecraft, the X-15, may get its initial flight tests. And watching the progress of this craft with special interest will be officials of a small chemical specialty company, Halocarbon Products Corp. (Hackensack, N.J.). Reason: the firm supplied X-15's rocket engine lubricants—polymers of chlorotrifluoroethylene.

Success in this X-15 venture will mean a lot to the eight-year-old company and its youthful, shirt-sleeved executives. Halocarbon has been virtually a one-product, one-customer outfit for much of its existence. X-15's flight could mean a way out of this precarious position: by making the military as well as Atomic Energy Commission a major buyer.

Atomic Take-Off: Halocarbon's one-customer status goes back to '54 when AEC contracted to buy from it—after competitive bidding—a relatively large and continuous supply of a special fluorinated coolant, 2, 2, 3 trichloroheptafluoro-n-butane. The resulting five-year contract has kept Halocarbon alive. Before getting the AEC contract, the company was making a line of polychlorotrifluoroethylene oils, waxes and greases. The high price of these materials and their newness made selling an uphill job. When the government gave it the coolant contract, Halocarbon happily turned its attention almost completely to the production of the perhalobutane compound.

But now the company is trying to walk without the crutch of its AEC contract. It is seeking new applications for its existing line of organic fluorine polymers. Going after new business is a staff well-experienced in technical know-how. Both Bob Ehrenfeld, company president, and Al Dittman, co-founder and research director, were long associated with the Manhattan Project and the organic fluorine compounds first used in A-bomb work. Halocarbon's vice-president in charge of engineering, Rex Conner, and its secretary, Oscar Blum, also worked on the wartime Manhattan Project.

It's not easy to persuade a customer to buy a grease that costs $12/lb.—but they're coming up with some regular buyers. Oxygen makers are now their customers—fluorinated lubricants replace ordinary lubricating oils in such plants, allow lower construction costs. And steelmakers' use of industrial oxygen on a big scale has also extended Halocarbon's market. When Linde Co., division of Union Carbide Corp., contracted for tonnage on-site oxygen plants for steelmaking and chemical production, Halocarbon got the lubricant business.

Although the firm is putting the most emphasis on its polychlorotrifluoroethylene oils, it says its per-

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Position_____

SPECIALTIES

halobutane process can produce other valuable products. For example, it can make derivatives of trifluoroacetic acid; they show great promise as synergists for DDT. And the butane polymer has possibilities as a liquid dielectric coolant for power transformers.

The company is also selling a flotation-damping fluid for inertial-guidance-system gyros. Its bromotrifluoroethylene polymer has a density of 2.4—the highest density yet developed for a flotation-damping medium.

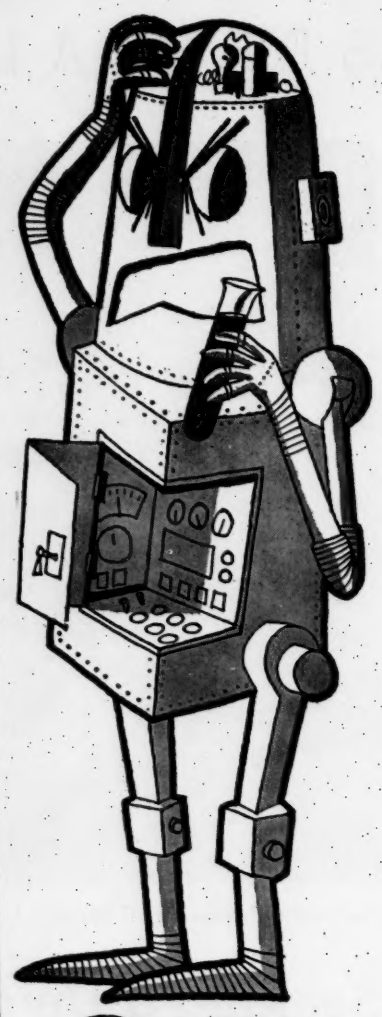
Lubricants for high-speed Teflon-to-metal bearings and packing materials for Teflon end rings are becoming important Halocarbon products. For the packing, Halocarbon turns out a nongelling plastic putty made by adding halocarbon oil fractions to finely divided Teflon.

None of these products, obviously, takes a lot of material. Even if they did become high-volume items, Halocarbon would probably not be able to lower their prices. For one thing, they are all based on a high-priced monomer—a Freon 113 derivative tagged at $1.70/lb. And producing a custom-formulated lubricant is time-consuming—it's not unusual for Halocarbon to spend six weeks (around the clock) to tailor-make a pound of polymer.

Nonetheless, Halocarbon has been able to successfully compete with such large companies as Hooker and Minnesota Mining & Mfg. in the chlorotrifluoroethylene polymer field, and to strike out alone in the fluorobutane coolant field. In doing so, the company refutes some of the notions of the role of the small specialty maker. It has shown it can sell more than quick delivery—it also offers research and development work that can match that of many larger companies. It's offering big-company advantages so that it might soon reach big-company status.

PRODUCTS

Office Glow: S. C. Johnson (Racine, Wis.) has a new furniture wax for maintenance use, called Shine-Up. It's intended for combined dusting-waxing operations. Sold in gallon containers ($8/gal.), Shine-Up can be dispensed from a small can with a plunger top. It can be used on wood, Formica, porcelain, brass, stainless steel, chrome, plastic wall tile, leather.



Cure for Waste "Indigestion"

...Jacques Wolf *Enzymes*

Jacques Wolf specific action enzymes insure rapid and complete liquefaction of waste materials. They get right to work and stay on the job until wastes are liquefied and drained off. Yes, Jacques Wolf enzymes actually "digest" wastes and flow them away!

Ideal for septic tanks, cesspools and sewers, they're highly concentrated to do a better, more effective job in less time.

Samples for testing are available; contact us today.

JACQUES WOLF & CO.
Chemicals PASSAIC, N.J.

Plants in: Clifton, N.J., Carlstadt, N.J., Los Angeles, Calif.

OXYGEN IS FACTOR IN BREAKDOWN OF MANY DIFFERENT PRODUCTS

Causes Rancidity, Gum-Formation, Embrittlement, Discoloration

USE OF ANTIOXIDANTS IS GROWING

Reports from agricultural and industrial fields indicate increased recognition of ubiquitous oxygen as a destructive threat to products containing fats, oils, waxes, hydrocarbons, plastics or rubber. Oxidation manifests itself in a variety of ways... as rancid lard, stale potato chips, unpalatable animal feed, gummed up gasoline, and cracked tire sidewalls. To combat the attack of oxygen, many companies are turning to antioxidants. Addition of these inhibitors in only very small amounts provides long-lasting protection against oxidative deterioration.

Lard is typical of food products needing protection against oxygen. Antioxidants effectively and economically retard decomposition that would otherwise result in poor color, aroma, taste or texture. Similarly, in baked products such as crackers, and in fried foods such as potato chips, antioxidants inhibit product deterioration, making complaints of rancidity a thing of the past.

Shelf life is increased when antioxidants are added to a fat-containing food, permitting distribution to be broadened to markets previously inaccessible.

Typical of the increasing importance of antioxidants is their role in helping to develop an entirely new outlet for inedible fats and oils ... animal feed. By stabilizing the fats in the feed and thus keeping the feed fresh and palatable, antioxidants were instrumental in creating a market for more than 300 million pounds of fats annually.

Antioxidants are used to retard formation of power-robbing gums in automotive gasoline and jet fuels. In transformer and turbine oils, antioxidants prolong the useful life of the oils by increasing their resistance to high-temperature oxidative reactions that build up sludge. Lower maintenance costs resulting from their use are an extra benefit for the electrical industry.

In the field of plastics, antioxidants are effective in protecting molded and extruded polyethylene against deterioration during both processing and use.

Rubber products also need protection against oxygen... actually against ozone, one of the most powerful and insidious oxidizing agents known. Even minute concentrations in the atmosphere can severely damage rubber products in a short time. To retard the cracking and checking caused by ozone, rubber processors depend on antiozonants.

In the field of agriculture, antioxidants extend the usefulness of insecticide formulations. In poultry feeds antioxidants help chicks to mature faster by protecting vitamin content, stimulating growth, improving pigmentation, and preventing certain deficiency diseases.

The best advice this report can give to manufacturers seeking to protect their products against the attack of oxygen is to seek out a leading supplier of antioxidants, for example, Eastman Chemical Products, Inc., as their laboratories are staffed with antioxidant specialists, ready to help you explore the benefits, use and cost of antioxidants in your product. Moreover, because Eastman manufactures all the principal antioxidants used commercially and have years of experience in this field, they are in the best possible position to offer unbiased constructive advice. You can get more information on the proper use of antioxidants by writing Eastman Chemical Products, Inc., subsidiary of Eastman Kodak Company, Kingsport, Tennessee.

Products in these fields know the value of Eastman antioxidants

Food	Insecticides
Rubber	Animal Feeds
Plastics	Hydraulic Fluids
Petroleum	Transformer Oils
Vegetable and Animal Oils	

When you must combat oxidative deterioration...

Eastman
ANTIOXIDANTS

SALES OFFICES: Eastman Chemical Products, Inc., Kingsport, Tennessee; New York City; Framingham, Massachusetts; Cincinnati; Cleveland; Chicago; St. Louis; Houston. West Coast: Wilson Meyer Co., San Francisco; Los Angeles; Portland; Salt Lake City; Seattle.

Checked your caustic costs: lately?

. . . upon request, a Wyandotte technical-service man will survey your requirements — help you decide if a switch from 50% to 74% caustic is economical

An increase in your caustic requirements, or a change in freight rates can alter your economic position almost overnight in regard to 50% or 74% concentrations. That's why it's wise to check your caustic costs periodically.

Here's an easy way to check: first, using the chart on the opposite page, plot your position in terms of annual requirements and freight rates to see if a saving is possible by switching to 74% caustic (send for Wyandotte's handy free guide, "74% or 50% caustic soda, which for you?" for more complete details). Then, with a basic understanding of your economic position, call in a Wyandotte technical-service man. Together you can analyze all the factors: the cost of concentration; end use of the caustic soda; existing storage and handling facilities; quantity of caustic consumed; plant location.

The results may reveal no savings at all by switching to 74% liquor, or you could save thousands of dollars. In either case, the assistance of a technically trained Wyandotte representative with his familiarity in all phases of caustic soda storage, handling, and uses is at your disposal . . . and there's no obligation. Get in touch with us today. *Wyandotte Chemicals Corporation, Michigan Alkali Division, Wyandotte, Michigan. Offices in principal cities.*

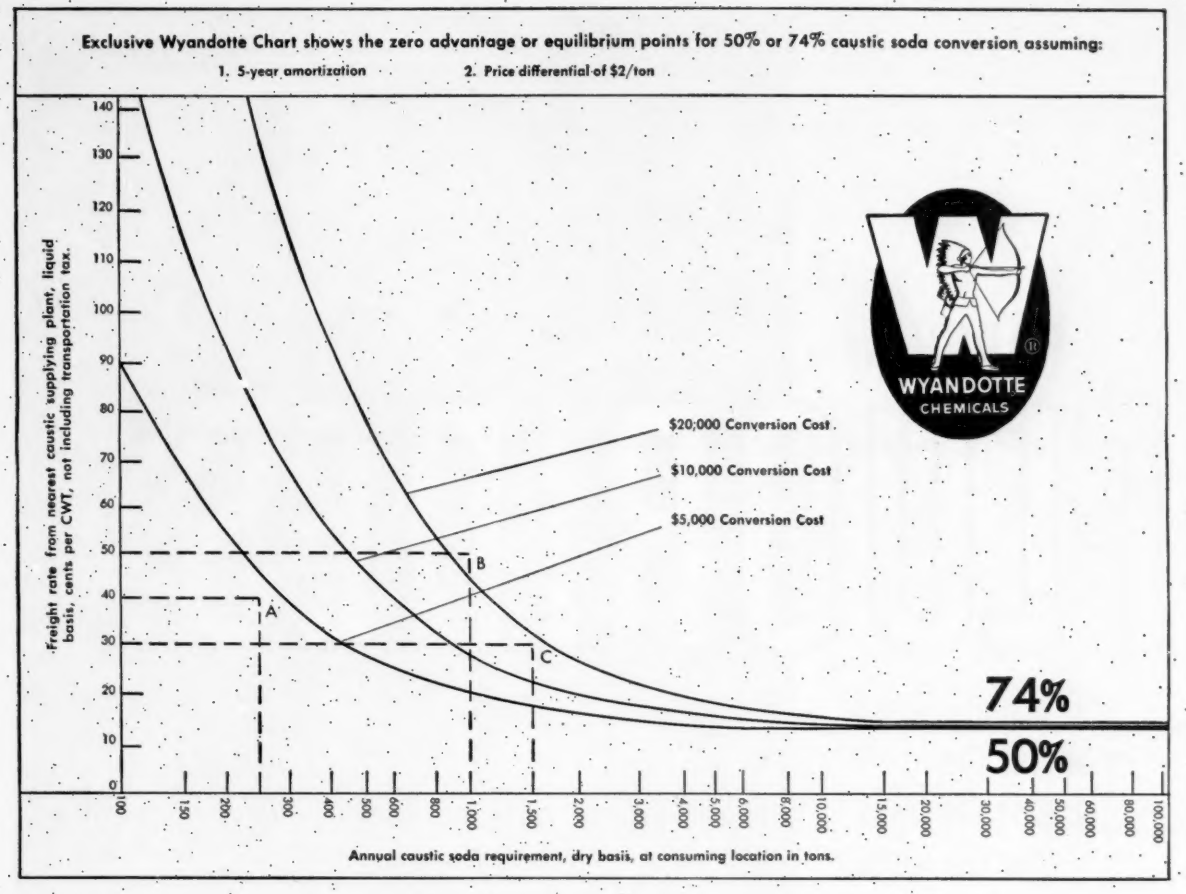
Wyandotte CHEMICALS

MICHIGAN ALKALI DIVISION

PACING PROGRESS WITH CREATIVE CHEMISTRY

1 After plotting your economic position on Wyandotte chart, call in your Wyandotte technical-service man. This study may bring to light savings of thousands of dollars in freight charges by changing to 74% liquor.

2 Wyandotte engineers — with broad experience in applications of caustic soda and the correct equipment for its proper handling — assist in designing heat exchangers, cooling tower piping, storage tanks, and materials of construction.



HOW TO USE CHART

EXAMPLE A: Freight from nearest producing point to consuming point is 40 cents per hundredweight. Annual consumption by consuming plant is 250 tons caustic soda, dry basis.

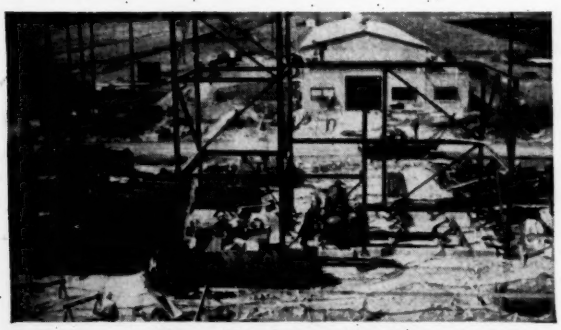
ANSWER: Because Point A lies to the left of the curves, the plant should purchase caustic soda as a 50% liquid.

EXAMPLE B: Freight from nearest producing point to consuming point is 50 cents per hundredweight. Annual consumption by consuming plant is 1000 tons caustic soda, dry basis.

ANSWER: Because Point B lies to the right of the curves, the plant should purchase caustic soda as a 74% liquid, even though additional equipment investment of as much as $20,000 might be found necessary.

EXAMPLE C: Freight from nearest producing point to consuming point is 30 cents per hundredweight. Annual consumption by consuming plant is 1500 tons caustic soda, dry basis.

ANSWER: Because Point C lies between the $10,000 curve and the $20,000 curve, the plant should purchase 50% caustic soda if the additional investment necessary exceeds about $15,000, or should purchase 74% caustic soda if the additional investment is less than about $15,000.



3 When construction problems arise, such as the location of equipment for most efficient operation or more economical installation . . . alternate valves or new materials of construction . . . the Wyandotte technical-service man is available for advice.

4 The Wyandotte technical-service man is on hand to help unload the first tank car of 74% caustic . . . seeing that the outlet leg is properly steamed, diluting water correctly proportioned, temperature controlled, safety precautions followed.

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FLUORIDES

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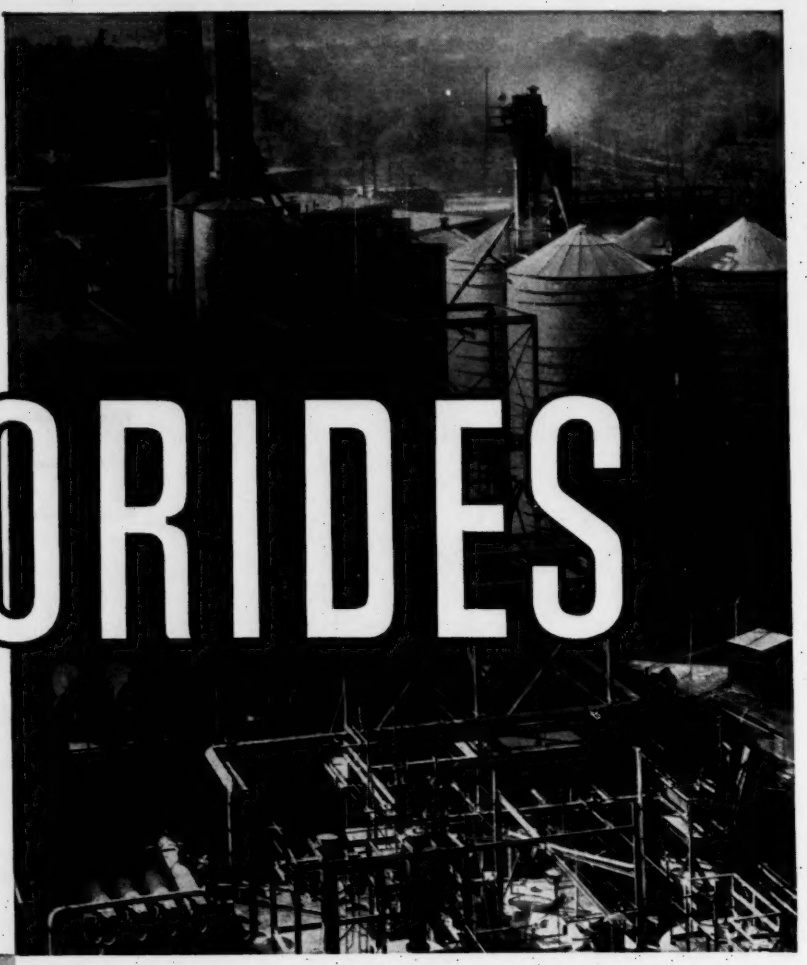
in one of the
largest facilities
in the world



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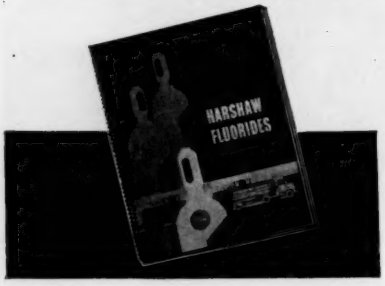
Write for your free copy of M.C.A. Chemical Safety Data Sheet SD-25 on properties and essential information about HYDROFLUORIC ACID Anhydrous and Aqueous.



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ANHYDROUS...AQUEOUS

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Ammonium Fluoborate
Antimony Trifluoride Sublimed
Barium Fluoride
Bismuth Fluoride
Boron Trifluoride
Boron Trifluoride Complexes
Cadmium Fluoborate
Chromium Fluoride
Copper Fluoborate
Fluoboric Acid
Fluorine Cells
Fluorinating Agents
Frosting Mixtures
Hydrofluoric Acid Anhydrous
Hydrofluoric Acid Aqueous
Hydrofluosilicic Acid
Lead Fluoborate
Metallic Fluoborates
Nickel Fluoborate
Potassium Bifluoride
Potassium Chromium Fluoride
Potassium Fluoborate
Potassium Fluoride
Potassium Titanium Fluoride
Silico Fluorides
Sodium Fluoborate
Tin Fluoborate
Zinc Fluoborate
Zinc Fluoride

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Woes of U.S. tin marketers include recession and advent of aluminum cans; now, another worry . . .

Will Russia Call the Tune on Tin Prices?

Tin producers are this week trying to find some bright spots in a rather grim marketing picture. They have been hit hard by the current recession in the U.S., top customer for the metal. Also, Russians are effectively disrupting world markets with increasing sales of cut-rate tin. And now there's another deepening trouble spot: the advent of aluminum cans.

Aluminum's poaching on the tin can's preserves first created a stir last year when Esso Standard revealed plans to sell motor oil in aluminum cans supplied by Reynolds Metals. But the Esso-Reynolds venture was frankly dubbed "experimental" (*CW, Nov. 2 '57, p. 75*) because certain marketing problems—notably the need to salvage used cans—were regarded by some as serious handicaps.

Now Continental Can says it will sell aluminum cans to several motor oil marketers—and these will be "priced competitively with ordinary tin-plated steel cans." And here's the added fillip: they wont be reclaimed as are Reynolds' cans. The obvious advantage: motor oil retailers won't have to bother about salvaging used cans—at best, a bothersome, time-consuming chore.

Evaluating a Threat: The debut of aluminum cans hit tin producers in an area where they have long felt secure. The '58 recession, for example, has showed again how relatively depressionproof the tin-plate container market is. Industry spokesmen say that gross can sales total more than $3 billion/year and that there's neither pinch nor boom. Steady demand for food cans has stabilized the business. Moreover, increased demand for aerosol containers has more than compensated for some drop in requirements for oil and beer cans. Nonetheless, tin producers are studying the aluminum can trials carefully.

Meantime, they have other, more pressing problems. In 57, U.S. tin

consumption—including both primary and secondary metal—dropped 8.3%, from 90,324 gross tons in '56 to 82,800 tons. Primary metal demand declined from 60,470 gross tons in '56 to 54,500 in '57; secondary tin demand slipped from 29,854 tons to 28,300 tons in the same period.

Virtually all end-uses of primary tin contributed to the decline. Cutbacks in auto production hurt particularly, although the per-car use now remains fairly high: Ford Motor Co., for example, estimates that each Ford passenger car takes 1.5 lbs. of tin; each Edsel, 2.2; each Mercury, 2.5 (figures include tin used in solder, plating and alloys).* On the other hand, Ford's over-all production has slipped from 1,358,195 units to 788,482 up to July 26 of this year.

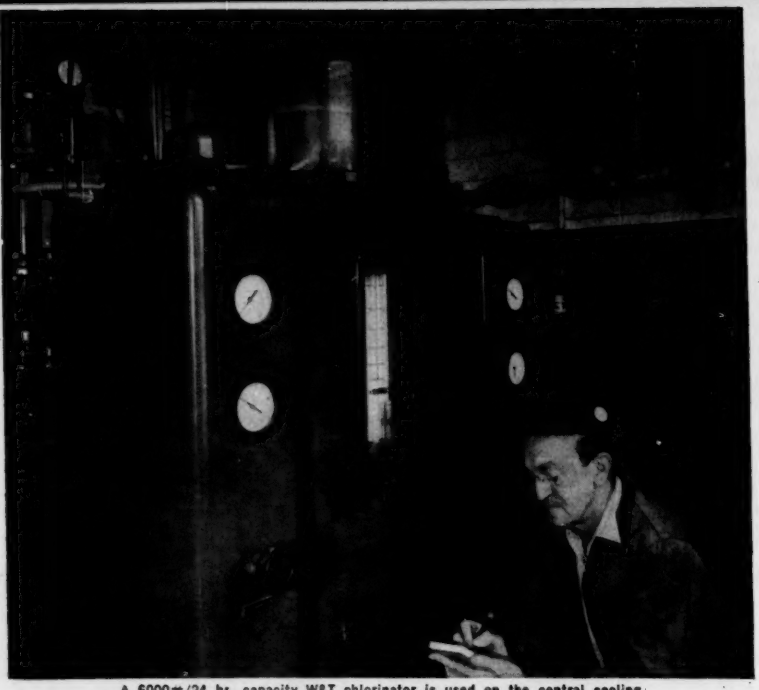
Production of tin chemicals also fell off recently. In '56, 779 gross tons of primary tin were used to make chemicals (including tin oxide); in '57, 600 gross tons were used. Likewise, use of secondary metal dropped —from 1,012 tons in '56 to 965 tons in '57, but tin producers think this slip in secondary tin for chemicals is only temporary.

Organotin Surge? One bright hope —organotins. Earlier this year, Metal & Thermit completed its giant organometallics plant at Carrollton, Ky. Within the first year or two of operations, the $3.5-million plant is expected to produce 2.5 million lbs. of chemical products. In a few years, output should rise to some 7 million lbs./year.

First products to be made at the Carrollton plant include a series of organotin compounds slated for use in the manufacture of vinyl plastics, rubber, biocidal and fungicidal agents, veterinary medicines and the like. It is, of course, still too early to predict accurately the future of the organotins, but tin producers are convinced they will find steadily increasing markets in this field.

Russian Rumble: Perhaps the most puzzling problem to tin producers has been posed by the Russians. In recent months, Communist nations' tin exports have taken on new proportions —e.g., shipments from Russia and Poland to West Europe amounted to

*Here's how Plymouth breaks down tin use on it's '58 models: body solder, 0.12 lbs.; tin plate, 0.03 lbs.; bearing alloys, 0.1 lbs.; radiator solders, 0.7 lbs.; fuel tank coating, 0.002 lbs.; heater solder, 0.3 lbs.; total—1.252 lbs./car.



A 6000#/24 hr. capacity W&T chlorinator is used on the central cooling water system at Marcus Hook, Penna. refinery of Sinclair Refining Company.

W & T CHLORINATION . . .

the economical way to prevent slime in cooling waters

Water used for cooling operations at the Marcus Hook refinery of Sinclair Refining Company is chlorinated to prevent slimes from fouling plant units and lowering cooling efficiency.

Chlorination of the system is accomplished by one **W&T** chlorinator operated from a program control panel. The control automatically starts and stops chlorination in accordance with a preselected schedule. Slime growths are eliminated in the cooling units without the need for continuous treatment.

For information about **W&T** chlorination for slime elimination write for Bulletin CD-43.24

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for synthetic lubricants that must meet rigid military specifications . . .

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Samples and product data available
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HARCHEM DIVISION
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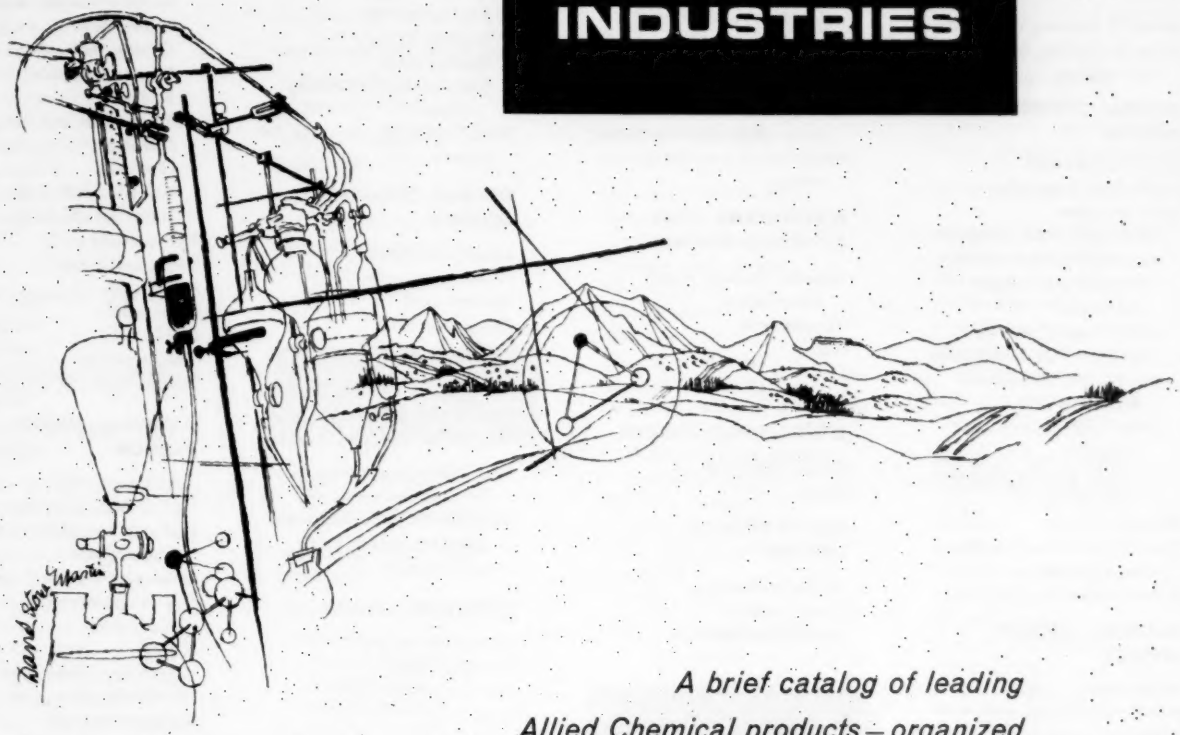
PRINCIPAL PRODUCTS FOR PRINCIPAL INDUSTRIES



A brief catalog of leading Allied Chemical products – organized by the industries they serve. Turn this page to see which can help improve your product or process.

Allied Chemical

A FEW OF ALLIED'S 3000 PRODUCTS . . . AND SOME OF THE INDUSTRIES WHERE THEY ARE USED

AGRICULTURE and Fertilizer

BARRETT DIVISION

BARRETT building materials
Protective paints, cements and coatings

GENERAL CHEMICAL DIVISION

ORCHARD BRAND insecticides, fungicides and herbicides
- DRITOMIC sulfur fungicide
- FILMFAST spreader-sticker
- GENICOP DDT copper fungicide
- GENITE early mite spray
- GENITOX DDT formulations
- MICRO-DRITOMIC sulfur fungicide
- SPRAYCOP copper fungicide
- STAFAST pre-harvest spray and fruit thinner

Phosphoric acid
STA-FRESH sodium bisulfite (silage grade)
Sulfuric acid

NATIONAL ANILINE DIVISION

Adipic acid
Hexahydrophthalic anhydride
Maleic anhydride
Malic acid
NACCONOL wetting and dispersing agents
NADIC anhydride
NADONE cyclohexanone
NATIONAL dyes for insecticides

NITROGEN DIVISION

12-12-12 fertilizer
ARCADIAN fertilizer materials
- Ammonia (anhydrous and aqua)
- Ammonium nitrate (pelleted)
- A-N-L nitrogen fertilizer (pelleted)
- FERAN ammonium nitrate solution (non-pressure)
- N-DURE urea formaldehyde solution
- NITRANA ammonium nitrate-ammonia solution
- Nitrate of soda
- Sulfate of ammonia
- U-A-S urea and ammonia solution
- URAN urea-ammonium nitrate solution (non-pressure)
- URANA ammonium nitrate-urea-ammonia solution
- Urea 45 fertilizer (pelleted)

PROCADIAN urea feed mixture

PLASTICS AND COAL CHEMICALS DIVISION

Coal-tar creosote wood preservative
Naphthalene
Niacin
Tar acids
Tar acid oils

SEMET-SOLVAY DIVISION

A-C polyethylene
Coke

SOLVAY PROCESS DIVISION

Calcium chloride
Caustic potash
Paradichlorobenzene

BUILDING Roofing and Wood Preserving

BARRETT DIVISION

ALLITE translucent plastic panels
BARRETT building materials
- Asbestos-cement siding shingles
- Asphalt roll roofings and sidings
- Asphalt shingles
- Damp-proofing and waterproofing materials
- Flashing blocks and forms
- Gypsum products
- Insulating board products
- Protective paints and cements
- Rock wool insulation
- Roof cements and coatings
- Roof drain and vent connections
- Roofing asphalt
- Roofing felts
- Roofing pitch
- Sheathings and building papers

SPECIFICATION pitch and felt
- Sub-floor tar

GENERAL CHEMICAL DIVISION

Aluminum chloride
Aluminum fluoride
Muriatic acid
Phosphoric acid
Sodium fluoride
Sodium silicate

NATIONAL ANILINE DIVISION

NACCONATE diisocyanates for urethane insulation
NACCONOL air entrainment agent in concrete and plasterboard

NITROGEN DIVISION

Ammonium sulfate
Formaldehyde
U.F. Concentrate-85
Urea

PLASTICS AND COAL CHEMICALS DIVISION

Coal-tar creosote wood preservative
CUMAR resin
PLASKON polyester resins
RESIN S synthetic resin

SEMET-SOLVAY DIVISION

A-C polyethylene pipe compound

SOLVAY PROCESS DIVISION

Calcium chloride
MUTUAL chromium chemicals
- Chromic acid
- Potassium bichromate
- Sodium bichromate
- Sodium chromate

Ortho-dichlorobenzene

CHEMICAL

BARRETT DIVISION

BARRETT building materials

GENERAL CHEMICAL DIVISION

Aluminum sulfate
Aqua ammonia
BAKER & ADAMSON reagents and fine chemicals
- Acetamide
- Acetates
- Boron trifluoride and complexes
- Chlorine trifluoride
- Cuprous chloride
- Fluorine
- Fluoborates and fluorides
- Nitrates
- Oxalates
- Potassium bifluoride
- Sulfur hexafluoride

Hydrochloric acid
Hydrofluoric acid
Mixed acid
Nitric acid
Oxalic acid
Sodium sulfites
Sulfuric acid

NATIONAL ANILINE DIVISION

Adipic acid
Aniline and derivatives
Anti-skinning agents and antioxidants
Dodecenyl succinic anhydride
Dye intermediates
Fumaric acid
H Acid
Hexahydrophthalic anhydride
LATHANOL detergent
Maleic anhydride
NACAN antireductant
NACCONATE diisocyanates
NACCONOL detergents
NADONE cyclohexanone
NAXOL cyclohexanol
Nitrobenzene
Nitrotoluenes and derivatives
Organic chemicals
Pharmaceutical intermediates
Phthalic anhydride
Succinic acid and anhydride
Tetrahydrophthalic anhydride

NITROGEN DIVISION

Ammonia
Ammonia liquor
Ammonium nitrate
Ammonium nitrate solutions
Ammonium sulfate
Ethanolamines
Ethylene glycols
Ethylene oxide

Formaldehyde
Methanol
Nitrogen tetroxide
Sodium nitrate
Urea
U.F. Concentrate-85

PLASTICS AND COAL CHEMICALS DIVISION

Acetone
Acetophenone
Alpha methylstyrene
Anthracene
Benzol
Bituminous coatings
Carbon pitch
Cresylic acid
Cumene
Cumylphenol
Ethylbenzene
Industrial coatings
Naphthalene
Phenol
Phthalic anhydride
Phthalonitrile
Tar acids
Tar bases
Toluol
Xylol

SEMET-SOLVAY DIVISION

Butadiene
Propylene
WILPUTTE coal chemicals plants

SOLVAY PROCESS DIVISION

Aluminum chloride
Ammonium bicarbonate
Ammonium chloride
Calcium chloride
Caustic potash
Caustic soda
Chlorine
Chlorobenzenes
Chloromethanes
Hydrogen peroxide
MUTUAL chromium chemicals
- Chromic acid
- Potassium bichromate
- Sodium bichromate

Potassium carbonate
Soda ash
Sodium chloride
Sodium nitrite

GLASS and Ceramic

BARRETT DIVISION

BARRETT building materials

GENERAL CHEMICAL DIVISION

BAKER & ADAMSON fine chemicals
- Potassium bifluoride
- Stannous chloride

Hydrofluoric acid
Iron sulfide
Sodium phosphates
Sodium sulfate
Sulfuric acid

NATIONAL ANILINE DIVISION

NACCONOL detergents

NITROGEN DIVISION

Ammonia liquor
Nitrate of soda
Urea

PLASTICS AND COAL CHEMICALS DIVISION

Optical pitch

SEMET-SOLVAY DIVISION

A-C polyethylene (emulsifiable)

SOLVAY PROCESS DIVISION

Ammonium bicarbonate
MUTUAL potassium bichromate
Potassium carbonate
Soda ash
Sodium nitrite

METAL

BARRETT DIVISION

BARRETT building materials

GENERAL CHEMICAL DIVISION

BAKER & ADAMSON fine chemicals
- Alkali fluoborates
- Fluoboric acid
- Metal fluoborates
- Metallic nitrates
- Potassium titanium fluoride
- Potassium zirconium fluoride

Hydrochloric acid
Hydrofluoric acid
Nitric acid
Sodium fluoride
Sulfuric acid

NATIONAL ANILINE DIVISION

COMPOUND 685 plating and stripping compound
NACCONOL detergents
NATIONAL dyes for anodized aluminum
Organic acids and chemicals

NITROGEN DIVISION

Ammonia liquor
Anhydrous ammonia
Sodium nitrate

PLASTICS AND COAL CHEMICALS DIVISION

Carbon pitch
Flotation agents
Industrial coatings
Pickling inhibitors
PLASKON plastics and resins
- Coating resins
- Foundry resins
- POLY-LEASE 77 mold release agent

Protective paints and coatings
Solvents

SEMET-SOLVAY DIVISION

A-C polyethylene lubricant and coating
SEMET-SOLVAY coke for blast furnaces and foundries
WILPUTTE coke ovens and coal chemicals plants

SOLVAY PROCESS DIVISION

Ammonium bicarbonate
Ammonium chloride
Calcium chloride
Carbon tetrachloride
Caustic potash
Caustic soda
Chlorine
Hydrogen peroxide
Methylene chloride
MUTUAL chromium chemicals
- Chromic acid
- Potassium bichromate
- Sodium bichromate

NITROX cleansing, neutralizing rust inhibitor
Ortho-dichlorobenzene
Soda ash
Sodium nitrite

PAINT Varnish and Lacquer

BARRETT DIVISION

BARRETT building materials
Refined tar

GENERAL CHEMICAL DIVISION

BAKER & ADAMSON fine chemicals
- Boron trifluoride and complexes
- Potassium fluoride

Sodium fluoride
Sodium silicate
Sodium tripolyphosphate
Tetrasodium pyrophosphate

NATIONAL ANILINE DIVISION

Aniline
ANTIOXIDANT B and D anti-skinning agents
Curing agents for epoxy resins
Dodecenyl succinic anhydride
Fumaric acid
Hexahydrophthalic anhydride
Maleic anhydride
Methyl NADIC anhydride
NACCONATE diisocyanates for urethane products
NACCONOL detergents
NADIC anhydride
NADONE cyclohexanone
NATIONAL ASA anti-skinning agent
NATIONAL dyes and pigments
NAXOL cyclohexanol
Phthalic anhydride
Succinic acid and anhydride
Tetrahydrophthalic anhydride

NITROGEN DIVISION

Ammonia liquor
Anhydrous ammonia
Ethanolamines
Ethylene glycol
Formaldehyde
Methanol
Triethylene glycol
U.F. Concentrate-85
Urea

PLASTICS AND COAL CHEMICALS DIVISION

Acetone
Benzol
CUMAR resins
ELASTEX plasticizers
Hi-Flash solvent
Phthalic anhydride
Phthalonitrile
PLASKON plastics and resins
- Alkyd resins
- Maleic resins
- Melamine resins
- Modified phenolic resins
- Silicone-alkyd resins
- Styrenated alkyd resins
- Urea resins

Toluol
Xylol

SEMET-SOLVAY DIVISION

A-C polyethylene (emulsifiable and powdered)

SOLVAY PROCESS DIVISION

Caustic soda
Methyl chloride
Methylene chloride
Monochlorobenzene

MUTUAL chromium chemicals
- Potassium bichromate
- Sodium bichromate
- Sodium chromate

Ortho-dichlorobenzene
Soda ash
Sodium nitrite

PAPER

BARRETT DIVISION

BARRETT building materials

GENERAL CHEMICAL DIVISION

Aluminum sulfate
Glauber's salt
Salt cake
Sodium silicate
Sulfuric acid

NATIONAL ANILINE DIVISION

CAPROLAN polyamide fiber
Fumaric acid
Maleic anhydride
NACCONATE diisocyanates (in coatings)
NACCONOL detergents and emulsifiers
NACCOTAN dispersing agent and mordant
NATIONAL paper dyes
Phthalic anhydride

NITROGEN DIVISION

Ammonia liquor
Anhydrous ammonia
Formaldehyde
Methanol
Triethanolamine
U.F. Concentrate-85
Urea

PLASTICS AND COAL CHEMICALS DIVISION

CUMAR resins
ELASTEX plasticizers
Fiber pitch
PLASKON urea resins
Solvents
Tar acids

SEMET-SOLVAY DIVISION

A-C polyethylenes
- Emulsifiable for paper size or coating
- High density for lamination
- Wax blends

SOLVAY PROCESS DIVISION

Ammonium bicarbonate
Calcium chloride
Caustic soda
Chlorine
Hydrogen peroxide
MUTUAL salt cake
Soda ash

PETROLEUM

BARRETT DIVISION

BARRETT building materials

GENERAL CHEMICAL DIVISION

Aluminum sulfate
BAKER & ADAMSON fine chemicals
- Boron trifluoride
- Fluosulfonic acid
- Metallic nitrates
- Potassium chromium sulfate

Hydrofluoric acid
Muriatic acid
Oleum
Phosphates
SULFAN stabilized sulfuric anhydride
Sulfuric acid

NATIONAL ANILINE DIVISION

Adipic acid
Dodecenyl succinic anhydride
Fumaric acid
Maleic anhydride
Malic acid
NACCOLENE oil-soluble detergent
NACCONATE diisocyanates
NACCONOL detergents
NACCOSOL wetting agents
NADONE cyclohexanone
NATIONAL dyes and pigments
NAXOL cyclohexanol
Organic chemicals and solvents
Phthalic anhydride
Succinic acid and anhydride

NITROGEN DIVISION

Ammonia liquor
Anhydrous ammonia
Diethylene glycol
Ethanolamines
Ethylene oxide
Triethylene glycol

PLASTICS AND COAL CHEMICALS DIVISION

Coal-tar saturated pipeline felt and fabrics
Naphthalene
Phenol
Pipeline enamels
Protective paints and coatings
Tank bottom compounds
Tar acids

SEMET-SOLVAY DIVISION

A-C polyethylene wax additive to lubricants and asphaltum
Engineering services
Pipes and valves

SOLVAY PROCESS DIVISION

Aluminum chloride
Ammonium chloride
Calcium chloride
Caustic potash
Caustic soda
Chlorine
Hydrogen peroxide
MUTUAL chromium chemicals
- Sodium bichromate
- Sodium chromate

NITROX cleansing, neutralizing rust inhibitor
Ortho-dichlorobenzene
OZENE solvent
Potassium carbonate
Soda ash
Sodium nitrite

PLASTICS

BARRETT DIVISION

BARRETT building materials

GENERAL CHEMICAL DIVISION

Acids
- Acetic acid
- Hydrochloric acid
- Hydrofluoric acid
- Mixed acid
- Nitric acid
- Oxalic acid
- Sulfuric acid

BAKER & ADAMSON fine chemicals
- Boron trifluoride
- Boron trifluoride etherate
- Boron trifluoride mono-ethylamine complex (Epon® curing agent BF_3-400)

GENETRON HL (fluorinated hydrocarbon) plastic

NATIONAL ANILINE DIVISION

Accelerators for polyester catalysts
Adipic acid
Aniline
Curing agents for epoxy resins
Dodecenyl succinic anhydride
Foaming agents
Fumaric acid
Hexahydrophthalic anhydride
Maleic anhydride
Methyl NADIC anhydride
NACCONATE diisocyanates for urethane products
NACCONOL and NACCOTAN wetting and dispersing agents
NADIC anhydride
NADONE cyclohexanone
NATIONAL dyes and pigments
NAXOL cyclohexanol
Phthalic anhydride
Succinic acid and anhydride
Tetrahydrophthalic anhydride

NITROGEN DIVISION

Ammonia
Ethylene glycol
Formaldehyde
Triethanolamine
Urea

PLASTICS AND COAL CHEMICALS DIVISION

Acetone
A-C polyethylene lubricants
Alpha methylstyrene
ELASTEX plasticizers
Phenol
Phthalic anhydride
PLASKON plastics and resins
- Alkyd molding compounds
- Melamine molding compounds
- Nylon molding and extrusion compounds
- Phenolic resins
- Polyester resins
- Urea molding compounds

POLY-LEASE 77 mold release agent
Solvents
Tar acids

SEMET-SOLVAY DIVISION

A-C polyethylenes
- High-density molding resin
- High-density pipe compound
- Low molecular weight resin

SOLVAY PROCESS DIVISION

Aluminum chloride
Ammonium chloride
Caustic soda
Chlorine
Chlorobenzenes
Hydrogen peroxide
Methyl chloride
Methylene chloride
Vinyl chloride

RAYON and Cellophane

BARRETT DIVISION

BARRETT building materials

GENERAL CHEMICAL DIVISION

Muriatic acid
Sodium bisulfite
Sodium sulfate
Sodium sulfite
Sulfuric acid

NATIONAL ANILINE DIVISION

NACCONOL wetting and dispersing agents
NACCOTAN A pitch solubilizer
NACCUFIX dye fixative for rayon

NATIONAL basic dyes for cellophane
NATIONAL dyes for rayon
Azoic bases & salts
CARBANTHRENE (anthraquinone vat)
DIAZINE (developed)
ERIE (direct)
ERIEFORM (direct-formaldehyde aftertreatment)
NACCOGENE (stabilized azoic)
NIAGARA (direct)
SOLANTINE (fast-to-light direct)
SOLVAT (leuco vat ester)
SULFINDONE (sulfur)
NATIONAL naphthols
NATIONAL spirit-soluble dyes for cellophane

NITROGEN DIVISION

Diethylene glycol
Ethylene glycol
Formaldehyde
U.F. Concentrate-85
Urea

PLASTICS AND COAL CHEMICALS DIVISION

Acetone
ELASTEX plasticizers
Solvents
Tar bases

SEMET-SOLVAY DIVISION

A-C polyethylenes for finishes and coatings

SOLVAY PROCESS DIVISION

Caustic soda
Hydrogen peroxide
Soda ash

ROAD BUILDING and Maintenance

BARRETT DIVISION

Crushed stone
Road asphalt
Sand and gravel
TARVIA bituminous gel
TARVIA-LITHIC bituminous concrete
TARVIA road tar

GENERAL CHEMICAL DIVISION

HCA herbicide
UROX herbicide

NATIONAL ANILINE DIVISION

CAPROLAN polyamide fiber (in conveyor belts)
NACCONOL wetting and dispersing agents

NITROGEN DIVISION

ARCADIAN fertilizer materials

PLASTICS AND COAL CHEMICALS DIVISION

Creosote

SEMET-SOLVAY DIVISION

A-C polyethylene

SOLVAY PROCESS DIVISION

Calcium chloride
Caustic potash
Caustic soda
MUTUAL chromium chemicals
Potassium bichromate
Sodium bichromate
Sodium chloride

SOAP and Detergent

BARRETT DIVISION

BARRETT building materials

GENERAL CHEMICAL DIVISION

Aluminum chloride
Aluminum sulfate
Muriatic acid
Oleum
Sodium metasilicate
Sodium silicate
Sodium sulfate
Sodium tripolyphosphate
SULFAN stabilized sulfuric anhydride
Sulfuric acid
Tetrasodium pyrophosphate
Trisodium phosphate

NATIONAL ANILINE DIVISION

Adipic acid
Fumaric acid
LATHANOL LAL detergent and foaming agent
Maleic anhydride
NACCOLENE A CONC. detergent
NACCONOL detergents
NAXOL cyclohexanol

NITROGEN DIVISION

Ethanolamines
Ethylene oxide
Urea

PLASTICS AND COAL CHEMICALS DIVISION

Cresols
Cresylic acids
Neutral tar oils
Phenols
POLAR refined naphthalene
Tar acid oils
Xylenol

SEMET-SOLVAY DIVISION

A-C polyethylene

SOLVAY PROCESS DIVISION

Aluminum chloride
Ammonium bicarbonate
Ammonium chloride
Caustic potash
Caustic soda
Chlorine
Potassium carbonate
SNOWFLAKE crystals-SNOWFINE (sesquicarbonate of soda)
Soda ash

TEXTILE

BARRETT DIVISION

BARRETT building materials

GENERAL CHEMICAL DIVISION

Acetic acid
BAKER & ADAMSON fine chemicals
Ammonium acetate
Boron trifluoride complexes
Cuprous chloride
Sodium bisulfite (anhydrous)
Zinc fluoborate
Zinc nitrate
Muriatic acid
Sodium phosphates
Sodium silicate
Sodium sulfate
Sulfuric acid

NATIONAL ANILINE DIVISION

CAPROLAN polyamide fibers
Filament yarns
Heavy yarns
Staple
Fumaric acid
Maleic anhydride
NACAN kier boiling assistant
NACCONOL detergents
NATIONAL dyes
ALIZAROL (mordant)
CARBANSOL (vat pigments)
CARBANTHRENE (anthraquinone vat)
CHROMOLAN (premetalized acid)
DIAZINE (developed)
ERIE (direct)
LANAMID (premetalized neutral)
NABOR (acrylic)
NACCOGENE (stabilized azoic)
NACELAN (disperse)
NACROSOL (azo pigment)
NIAGARA (direct)
SOLANTINE (fast-to-light direct)
SOLASTRAL (phthalocyanine pigments)
SOLVAT (leuco vat ester)
SULFINDONE (sulfur)
SUPERCHROME (mordant acid)
Phthalic anhydride

NITROGEN DIVISION

Ammonia liquor
Anhydrous ammonia
Diethylene glycol
Ethanolamines
Ethylene glycol
Ethylene oxide
Formaldehyde
U.F. Concentrate-85
Urea

PLASTICS AND COAL CHEMICALS DIVISION

ELASTEX plasticizers
Industrial solvents
Naphthalene
Tar acids
Tar bases

SEMET-SOLVAY DIVISION

A-C polyethylenes
Emulsifiable for sizing and finishing compounds
High density for laminations
Hot melt for coating and backing

SOLVAY PROCESS DIVISION

Ammonium chloride
Calcium chloride
Caustic potash
Caustic soda
Chlorine
Cleansing Soda X, XX-cleansing compounds
Hydrogen peroxide
Methylene chloride
MUTUAL chromium chemicals
Chromic acid
Potassium bichromate
Sodium bichromate
Sodium chromate
Potassium carbonate
SNOWFLAKE crystals-SNOWFINE (sesquicarbonate of soda)
Soda ash
Sodium nitrite

The capitalized product designations on these pages are Allied Chemical trademarks.

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Barrett Division—prepared roofing; built-up roofing; insulating board, gypsum and other building products; paving materials.

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National Aniline Division—NATIONAL dyes and certified colors, NACCONOL detergents, organic chemicals and intermediates, pharmaceutical chemicals, NACCONATE diisocyanates for urethanes, CAPROLAN polyamide fiber.

Nitrogen Division—ARCADIAN fertilizers, nitrogen solutions, PROCADIAN feed mixtures, ammonia, urea, ethylene oxide, ethylene glycols, ethanolamines.

Plastics and Coal Chemicals Division—coal-tar chemicals; PLASKON molding compounds, industrial resins and coating resins; industrial tar products including creosote oils, pitches, coatings and pipeline enamels.

Semet-Solvay Division—A-C polyethylenes, coke and by-products, WILPUTTE by-product coke ovens, engineering services.

Solvay Process Division—soda ash, caustic soda, potassium carbonate, caustic potash, chlorine, chloromethanes and benzenes, hydrogen peroxide; calcium, aluminum and ammonium chlorides; cleaning compounds; vinyl chloride; MUTUAL chromium chemicals.

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For more information on any of these products, write Allied Chemical, Dept. 88-W, 61 Broadway, New York 6, N. Y.

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3,100 tons in the first two months of '58. This is twice the export pace of '57, when they shipped only 9,300 tons in 12 months. Moreover, Russians have offered their tin at cut prices. (They have also trimmed prices of aluminum.)

Tin producers don't know how to cope with the Russian tactics. Some tin marketers believe Russian metal is being deliberately pushed to wreck the International Tin Agreement (which most tin producing nations have signed—U.S., Japan, West Germany are exceptions). Nonetheless, the International Tin Council (an international organization of tin producers) now sees only one solution: invite the Russians to be producer-members of the international group, bound by its policies.

Right now, however, it's hard to see why the Russians would accept the invitation and voluntarily cut their tin exports.

Meanwhile, the International Tin Council in making an effort to change U.S. policy regarding its customer status in the world tin arena. The council hopes the U.S. will cease being neutral toward the International Tin Agreement, will actively participate in it. Should the U.S. accede, West Germany and Japan are expected to follow suit.

But U.S. aloofness from the council is relatively insignificant, compared with Russia's attitude. World tin producers have little cause to grumble about the U.S. position—so long as the U.S. refrains from selling tin from its huge stockpile. One explanation of why Russia's exports have increased is that the government is selling from stockpiles. Western countries, it's pointed out, have reduced their estimates of strategic requirements for tin and other metals. Presumably Russia has done the same—its stock may be excessive; hence, the increased foreign sales.

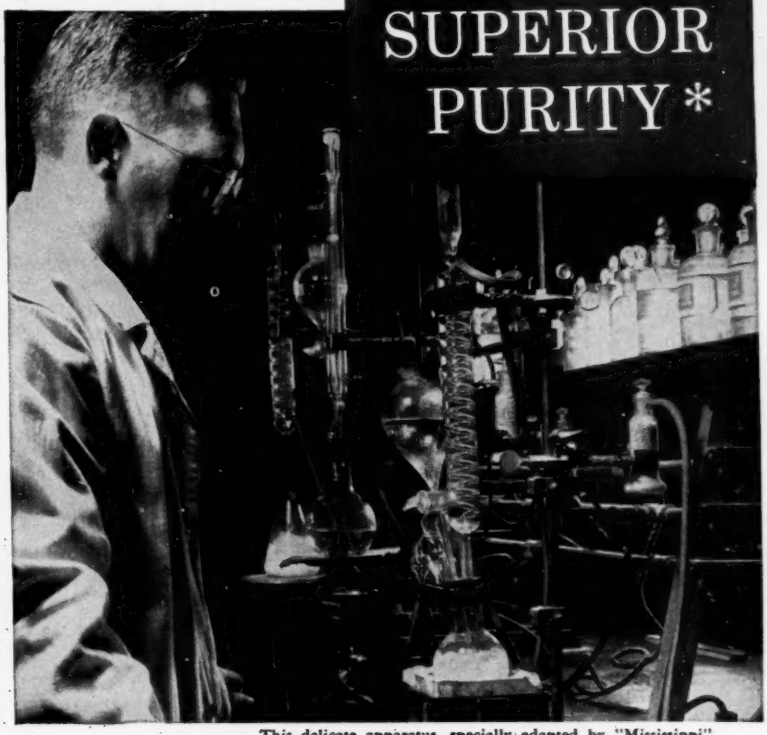
Tin observers generally agree, however, that stockpile selling is only a part of the Russian story; they say that production of tin in Russia has increased markedly, but the extent of production is a riddle.

With the U.S. recession apparently waning, the remaining problems that face tin producers—competition from Russia and from aluminum suppliers—are clearly defined. Not so clear is the magnitude of these threats.

To eliminate Uncertainty

in lime operations standardize on this

LIME of SUPERIOR PURITY *



This delicate apparatus, specially adapted by "Mississippi" technicians, measures calcium carbonate content.

**Mississippi Lime Company's entire limestone deposits test 99% pure calcium carbonate . . . a natural purity and uniformity unequalled in such quantity anywhere.*

It is because of the purity of this limestone, carefully sealed deep underground in Southeast Missouri, that Mississippi High Calcium Lime and Mississippi Lime products have earned a national market.

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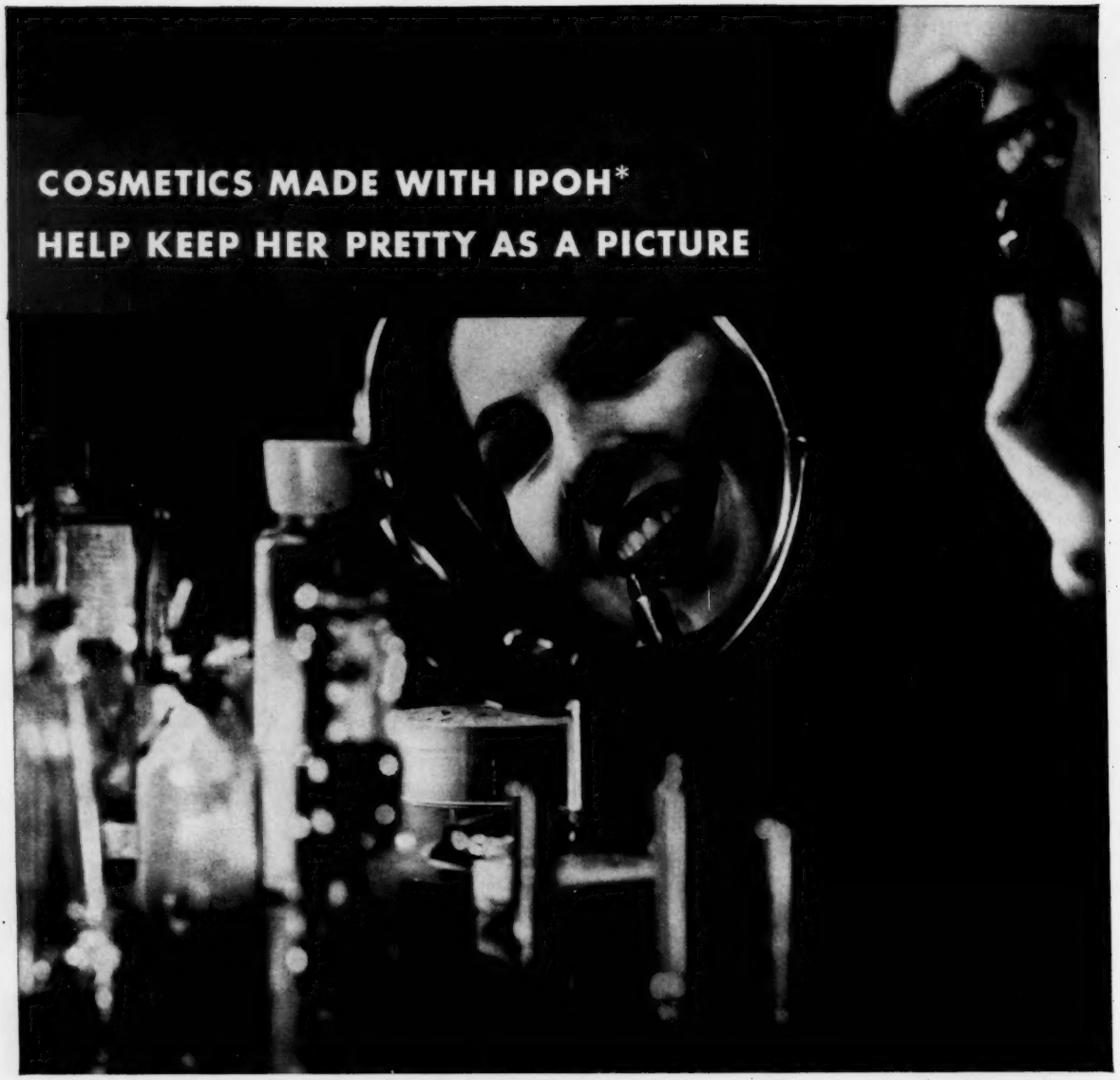

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ADMINISTRATION

Tape Tackles Tall Order

National Distillers & Chemical Corp. this week is unveiling its latest development in communication. It's a leased-wire Teletype system with an added fillip—integrated data processing. The new setup is said to be one of the most complete systems of its kind in the beverage and chemical process industries.

The system connects 40 plants, shipping points, sales offices and company headquarters with each other via a 7,500-mile network through 27 cities. It presently performs these functions:

- Assistance in the scheduling of production.
- Complete invoicing and order processing.
- Compilation of sales, order and production statistics.
- Statistics for budget and inventory control.
- Handling of administrative messages and directives.
- Speedup of delivery of products to customers.

It's expected that additional functions, such as processing accounts receivable, payrolls, etc., soon will be added to its jobs.

Heart of the system is standard punched-tape coding and programing equipment that permits instantaneous reproduction of original messages anywhere along the line. What makes it different from most other systems is that there's chance of a human error only once—at the point of message origin. From then on, machines do all the copying, sorting and analyzing.

Program Review: Take a hypothetical case in the firm's USI chemicals division. A salesman in Los Angeles gets an order for materials made at Tuscola, Ill. He turns the order over to the Los Angeles sales office, where it is reviewed for credit and basic acceptance.

An order typist at Los Angeles, using a master tape programed with information about the customer, and another for the products, makes up a quintuplicate order form on a special typing machine. As the master tapes put basic information on the forms, the typist inserts the variable information in the appropriate blank spots. (Distillers says that human errors are thus held at a minimum because only 5% of the information that goes through the machine is variable. The rest is from the master tapes.)

Coast-to-Coast Hookup: As the material goes through the taping machine, a "transmittal" tape embodying both fixed and variable data emerges, as well as a secondary, "by-product" tape punched with selected data from which material of no consequence to further data processing has been automatically filtered. The typing machine and its attached components automatically figure prices, totals and the like, as well as condensing "by-product" tape information into code units.

The two resulting tapes are then sent out. The transmittal tape flashes data to the proper production and shipping centers at Tuscola through a filter center at Cincinnati, where messages are redirected to appropriate destinations. Thus, Tuscola gets exact copies of the original order and invoice forms.

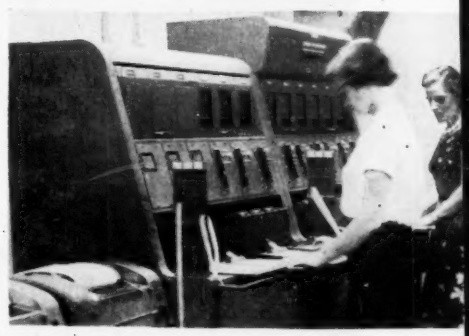
The by-product tape goes on to New York headquarters, where its abbreviated aggregate data goes through the integrated data processing equipment for analysis and control purposes. In this step, most of the material on the by-product tapes is transferred automatically to punch cards for use in tabulating, sorting and analyzing equipment.

Custom-Tailored: Distillers' system is highly tailored to the company's own needs. For example, requirements of the beverage division and the chemical division are inherently different. In the former — because of the variance among state liquor laws and the stringent requirements of federal liquor laws — order acceptance and invoicing, as well as accounts receivable and production management, are highly centralized. Thus the system allows for acceptance and processing of orders in the New York offices, while production plants are scheduling future production on the basis of order duplicates that still await final approval from New York.

Chemical sales, on the other hand, are highly decentralized, so that in most cases orders go directly from sales office to plant for processing, while New York offices receive the data only as information rather than as a basis for acceptance or rejection of each order.

Other Uses: Distillers feels that its system has much to offer in addition. It is already being used to send and receive administrative messages, thus eliminating a good deal of costly mailing and long-distance telephone calls. The network is tied directly into

Original data is taped once . . .



Is rerouted at refile center . . .

Data-processed elsewhere.

comes with your order for

TAR BASES FROM KOPPERS

Pyridine, picoline, lutidine, collidine, quinoline and 15-18 tar bases; all are available in quantity from Koppers in tank cars, trucks, or 55 gallon containers.

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Backing up these knowledgeable field representatives is the Koppers Technical Department, probably the most experienced group in the industry on coal chemicals and their applications. All told, you'll be time and money ahead when you place your orders for tar bases with Koppers. For full information, write Koppers' Tar Products Division, Pittsburgh 19, Pa.

KOPPERS

KOPPERS
COAL CHEMICALS

Western Union lines, so that a message to be sent to a city not on the leased wires goes to the nearest network city, where it is automatically transferred to Western Union lines. This way, Distillers pays only local telegram costs between the network city and the destination.

Programing is now in process to handle employee wage-check make-up on an electronic computer at New York headquarters. Each employee's basic data on rates, deductions, payroll number and the like will be kept on punch cards, and weekly variable data such as overtime will be sent in over the network. The variables and fixed data will be fed into tabulating and computing equipment and checks will be printed at all locations by tape transmission. Tabulating and computing for the company's stock participation plan are already being handled centrally, though data transmission is by mail. This may be switched to Teletype as well.

Distillers considers the system as basically a communications device, extremely flexible and with wide latitude for expansion above current rates of 30,000 messages and orders per month. And, the company believes it has the foundations for a communications system that can now grow as rapidly as the company grows, without a corresponding increase in administrative overhead.

Grocery Store Drugs

Minnesota has been given another chance to halt the sale of certain drugs in retail outlets other than drugstores.

The state's supreme court ordered a new trial after it reversed a county district court ruling in favor of Red Owl stores and Groves-Kelco, Inc., wholesale distributor of nonfood items.

The court's majority opinion, written by Justice William Murphy, said the state "has a prima facie case, in view of public policy . . . that uncontrolled sale of drugs and medicines is inimical to public health."

Among the items described as drugs by the state in oral argument before the supreme court were Bufferin, aspirin, Anacin, Bromo-Seltzer, Alka-Seltzer, Pepto-Bismol, Pinex, Murine, Ex-Lax, Feen-A-Mint, Sal Hepatica, Bromo Quinine, Aspergum, Lysol, 4-Way Cold Tablets, Castoria and Vicks Va-Tro-Nol.

POISON IVY ITCH loses its fire fast in the soothing spray from a handy Crown Spra-Tainer—first and most popular aerosol package. And fast is the word for the way sales go up when products of all kinds are pressure packaged with the help of Crown, pioneer in the field. Crown is the only source of both seamless and fabricated Spra-Tainers . . . offers you five different sizes . . . has unparalleled experience in aerosol packaging. Let Crown serve you.

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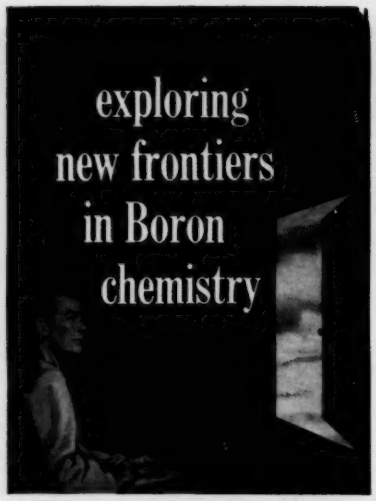

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Chemical Fringe Benefits Outpace* All-Industry Average

How 36 chemical firms paid fringe benefits in 1955 and '57, compared with 694 manufacturing companies

Benefits	1955		1957		Percent Change	
	All	Chemicals	All	Chemicals	All	Chemicals
As % of payroll, total	18.3%	22.0%	20.4%	24.9%	+11.5	+13.2
As ¢ per payroll hour	37.2¢	45.7¢	45.5¢	56.7¢	+22.3	+24.1
As $ per year per employee	$792	$961	$952	$1,191	+20.2	+23.9

*Source: U.S. Chamber of Commerce.

Fringe Benefits Move Up

Makers of chemicals and allied products ran second only to petroleum producers among all manufacturing industries in paying fringe benefits to employees during 1955 and '57. That's the gist of the newest of the biennial surveys of fringe benefits issued recently by U.S. Chamber of Commerce.

A comparison (*see table*) of 36 companies making chemical and allied products that reported in '55 and '57 shows that in '57 the companies boosted their fringe benefit payments 13.2% (on a total dollar spent basis). For those firms, which had a total payroll of 809.5 million, this was an amount equivalent to almost 25% of total payroll. The same companies in '55 were paying an amount equivalent to 22% of total payroll. The increase was well above the 11.5% increase for the 694 companies in the manufacturing industries reporting both years.

In dollar amounts, the report showed, the 36 companies in '57 paid $1,191/year/employee in fringe benefits, a 23.9% increase over '55. The petroleum industry alone exceeded chemicals in these payments.

Breakdown: Figures for '57 reveal that as a percentage of payroll:

- Legally required payments (employer's share only) equaled 3.4%.
- Pension and other agreed-upon payments (employer's share only) equaled 7%.
- Paid rest periods, lunch periods and the like equaled 3.1%.
- Payments for time not worked equaled 7.6%.
- Profit-sharing payments, bonuses and such equaled 3.8%.

On a broader base of 48 companies, embracing the 36 firms mentioned, the survey shows that chemical makers were paying $1,110/employee/year (*CW Business Newsletter, Aug. 9*), equivalent to 52.9¢/-hour. By region, companies in the Northeast (including New Jersey, New York and Pennsylvania) last year put up fringe benefits equal to 31.1% of payroll; those in the North Central states of Illinois, Indiana, Michigan, Ohio and Wisconsin put up 22%, while those in the Southeast paid 24%. Not enough firms in the West responded to provide a meaningful figure.

Large Leaders: Large companies employing over 5,000 people paid the largest fringe benefits, relative to payrolls. Benefits cost them the equivalent of 27.5% of their payroll. Second-largest payers of benefits, however, were companies in the group hiring between 500 and 999 employees, putting out amounts equal to 27.2% of payroll. Lowest of all was the group of companies representing 1,000 to 2,499 employees, paying fringes equal to 20.6% of payroll.

The wage data for chemical and allied products makers showed an average payroll of $4,625/year/full-time employee. Using that figure as a base, the survey indicates that 92.5% of it was straight-time pay, 3% overtime premium pay, 0.7% holiday premium pay, 0.7% shift differential, 2.1% earned incentive or production bonus, and 1% as other payments.

The chamber's survey covered 1,020 firms in all types of businesses. Of these, 102 have submitted data in each survey since '47; the latter in '57 paid 2.7 times the $420 per employee it paid in '47.

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Commercial Grades of 77.67 to 122.5% H_2SO_4. *"Special Grade"* concentrations of 93 to 100% H_2SO_4 with iron guaranteed less than 50 ppm and similarly low content of nitrogen, arsenic and other impurities. *Electrolyte Quality* at Sp.Gr. 1.300, 1.360, 1.400, 1.500 and 1.835. *Oleum* in all concentrations from 15% free SO_3 to 100% Liquid SO_3 (equivalent to 103.38 to 122.5% H_2SO_4). *Regenerated* Acid sludges are decomposed, regenerated and delivered as water-white 98% H_2SO_4 on an established contract basis. *Spent Acids* from the manufacture of white oils, fuels, chlorine gas, alcohols, DDT, butadiene and other products are recovered, regenerated or fortified for re-use at the source or for different use. In any case, Stauffer processing and contract arrangements eliminate waste, eliminate air and stream pollution or the alternative of in-plant conversion of process residues.

MURIATIC ACID

Delivered in standard strengths of 18°, 20° and 22° Bé corresponding to 27.92, 31.45 and 35.21% HCl. Stauffer also offers an extremely high-purity, high-analysis grade of muriatic acid for special uses. All grades are available in tank cars, tank trucks and carboys.

NITRIC ACID

Commercial Grades of 38°, 40° and 42° Bé corresponding to 56.52, 61.38 and 67.18% HNO_3. *Engravers' Quality* of the same concentrations is conditioned to prevent fuming and discoloration of etching plates.

HYDROFLUORIC ACID

Anhydrous, is shipped in 22-ton and 42-ton tank cars, and in 100- and 200-pound cylinders from the Nyotex Chemicals Division of Stauffer Chemical Company at Houston; aqueous acid from the Stauffer plant at Louisville, Ky.

STAUFFER CHEMICAL COMPANY

380 Madison Avenue, New York 17, New York
636 California Street, San Francisco 8, California
Consolidated Chemical Division: 6910 Fannin Street, Houston, Texas

Stauffer's Sulfuric Acid is shipped from Mobile, Ala., Los Angeles and Richmond, Cal., Hammond, Ind., Baton Rouge, La., Baytown, Fort Worth and Houston, Tex., and various stock points. Hydrochloric Acid is shipped from Richmond, Cal., and Fort Worth; Hydrofluoric Acid (anhydrous) from Houston; (aqueous) from Louisville.

80 YEARS OF SERVICE TO INDUSTRY

testify to Stauffer Chemical Company's reliability as a major source of volume acids and an authoritative source of information on their use and handling.

Stauffer CHEMICALS SINCE 1885

SOLVENT RECOVERY SAVES MONEY

SAVE 65% TO 80% ON PROCESS SOLVENT COSTS

Solvent recovery by the COLUMBIA Activated Carbon system is the efficient, economical way to recover solvents vaporized in manufacturing processes. Thus, it saves you money. Alcohols, esters, ethers, ketones, hydrocarbons, chlorinated compounds, and practically all mixtures of these solvents can be recovered and reused. And look at these facts . . . *efficiency—more than 99%: cost—1 to 2¢ per pound of recovered solvent.* Thus, you save 65% to 80% on your process solvent costs.

Here's how solvent recovery works. Vapor laden air is drawn from the evaporation process and passed through a bed of COLUMBIA activated carbon. The solvent vapor is adsorbed on the carbon and the denuded air is discharged into the atmosphere. When the carbon becomes saturated, the vapor laden air is switched to a second adsorber.

Then, low-pressure steam drives the solvent out of the carbon bed and the steam-solvent mixture is condensed. If the solvent is insoluble in water, an automatic decanter separates the mixture. If the solvent is water-soluble, distillation does the job.

CARBIDE can tell you how a solvent recovery plant can recover your process solvents. Write now for the booklet, "Solvent Recovery by the COLUMBIA Activated Carbon System." Address Department B, Union Carbide Olefins Company, 30 East 42nd Street, New York 17, New York.

UNION CARBIDE

UNION CARBIDE OLEFINS COMPANY

Division of Union Carbide Corporation
30 E. 42nd Street, New York 17, N. Y.

"Columbia" and "Union Carbide" are registered trade marks of Union Carbide Corporation.

ADMINISTRATION

LABOR

Defense Vote: Production and maintenance workers at the Du Pont-operated Savannah River nuclear plant last week vetoed representation by Savannah River Atomic Metal Trades Council (AFL-CIO). The vote, 1,827 against and 1,270 for, was the employees' third vote against representation. Said Du Pont, "We are, of course, pleased. . . that employees have expressed their confidence in the employee-management relationship that has existed during the past six years."

•

Stauffer Settlement: A strike by employees at Stauffer Chemical Co.'s Richmond and San Francisco plants has ended with 200 men from both plants going back to work. Settlement included a 3½% wage increase and liberalization of medical benefits. The union originally sought a 10% increase in wages.

KEY CHANGES

Robert G. Urban to president and chief executive officer, Hazel Bishop, Inc. (New York).

Herman Bogaty to associate research director, Toni Co. (Chicago).

William M. Govier to director of clinical research; and **Marshall R. Warren** to director of pharmacology, Division of Basic Sciences; Warner-Lambert Research Institute (Morris Plains, N.J.).

Martin E. Roberts to vice-president and director, Lummus Co. Canada Ltd. (Montreal).

Derek Richardson to vice-president of aluminum sales, Metals Division, Olin Mathieson Chemical Corp. (New York).

CONSULTANTS

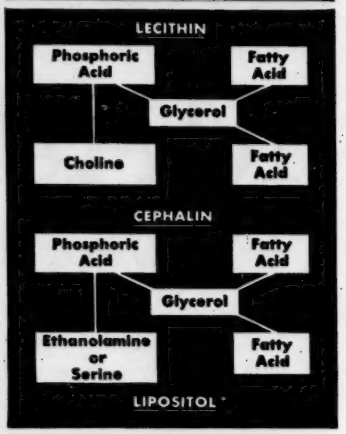
Walter E. Lobo, formerly of M.W. Kellogg and Devys & Lobo, establishes chemical engineering consulting firm (New York).

DIED

Kenneth Cooke Brownell, 55, board chairman, American Smelting and Refining Co. (New York), at New York.

Staley's®

Products from Corn and Soybeans



Staley's Refined

LECITHIN

(POWDERED or GRANULAR)

A Refined Natural Source of Vegetable Phospholipids and Vitamins for Pharmaceutical and Nutritional Uses

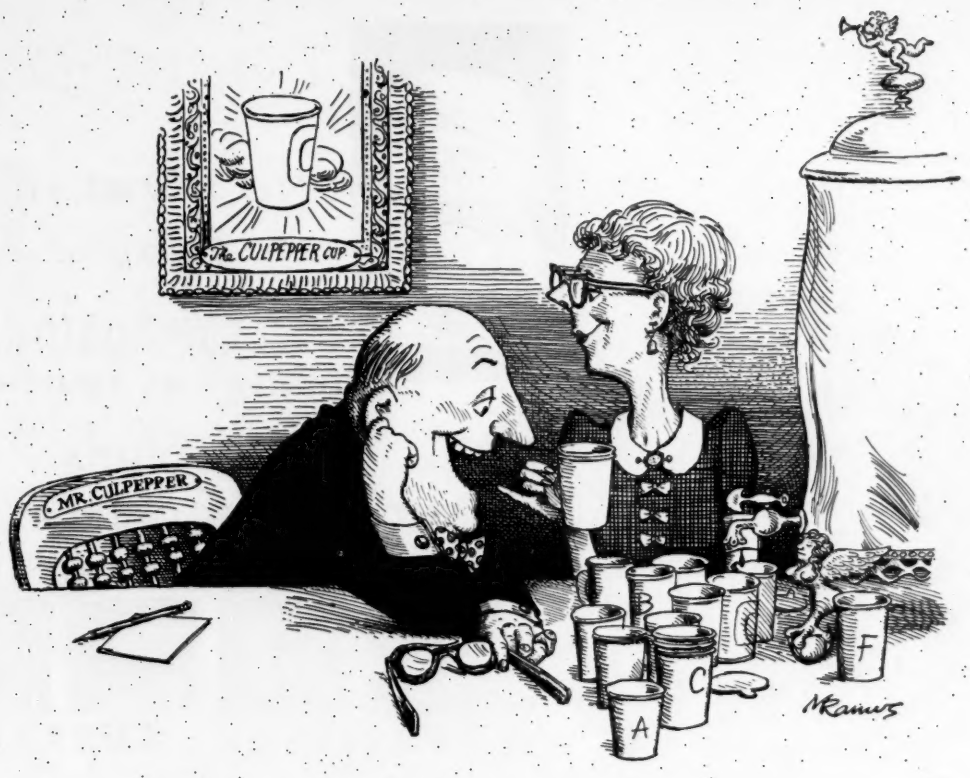
Staley's, the pioneer soybean processor, offers Natural Lecithin as a nutritional adjunct or supplement. This highly refined Lecithin is a concentrate (95+%) of the naturally occuring vegetable phospholipids or phosphatides (Lecithin), Cephalin and Lipositol) and vitamins in powdered or granular form. Indicated uses are in Pharmaceutical and Dietary foods.

Staley's Refined Lecithin (powdered or granular), obtained by an advanced refining process, is uniform and free of undesirable or inedible fractions. For specific application data, call your Staley Representative at the office nearest you. Or write for descriptive literature.

***Molecular structure of Lipositol has been indicated but unconfirmed. Material does contain:**
Fatty Acid, Glycerol, Inositol, Galatose, Ethanolamine and Phosphoric Acid Radicals.

For information about other Staley Products: Lecithin, Leucine, Phytic Acid, Inositol, Tyrosine, MSG, HVP, Calcium Phytate, Amino Acid Mixtures, Corn Steep Liquor and Fermentation Nutrients, write:

A. E. Staley Mfg. Co., Decatur, Ill.



The Perfect Solution

(in good taste)

"Well, Miss Milldew, how do we feel that one tastes," inquired Culpepper, the cup manufacturer, eagerly.

"This one tastes good — uh — like coffee should," replied the hornrimmed home economist, shyly.

"Thought it would," said Culpepper triumphantly, *"That's the one!* The *very* one ... It's the plastic coating that makes the difference. And Pfizer Citroflex® A-4 plasticizer gives us the best plastic coated hot drink cup Culpepper company ever made! Citroflex is odorless and nontoxic."

"It should be delightful with my warmed skimmed milk in the afternoon," murmured Miss Milldew joyously.

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

Whenever you need a nontoxic, odorless plasticizer for vinyls or cellulosics, investigate the Pfizer Citroflexes. *They are surprisingly low in cost!* Citroflex A-4 (Acetyl Tributyl Citrate) is especially suited for plasticizing polyvinyls. Citroflex A-2 (Acetyl Triethyl Citrate) is for cellulosics. Both are nontoxic and odorless and accepted by the F. & D. A. for fatty and non-fatty foods. *For any problem which might be solved by a high quality organic chemical, think of Pfizer first.* Chas. Pfizer & Co., Inc., Chemical Sales Division, 630 Flushing Ave., Brooklyn 6, N. Y.

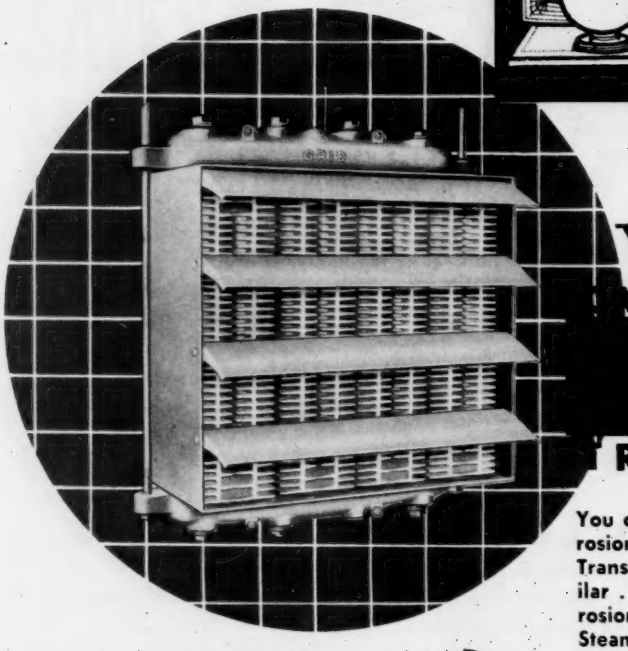
Pfizer **CHEMICAL SALES DIVISION**

... sells more than 100 organic chemicals for food, medicinal and industrial uses.

Some bulk products of this Division are:

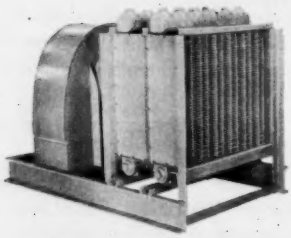
CITRIC, TARTARIC, OXALIC ACIDS AND SALTS • ASCORBIC ACID AND OTHER VITAMINS • CAFFEINE • ANTIBIOTICS • PLASTICIZERS

No Mystery--
No Magic-but
Corrosion
IN HEATING EQUIPMENT
Ends
When You Install
[redacted]AST IRON STEAM HEAT [redacted] [redacted] [redacted] [redacted]
[redacted]TRANSFER SURFACE



You once and for all eliminate internal electrolytic corrosion because all metals in GRID Cast Iron Steam Heat Transfer Surface that are in contact with steam are similar . . . not 2 or 3 different metals that promote corrosion to cause leaks and breakdowns. GRID Cast Iron Steam Heat Transfer Surface also eliminates external corrosion because its cast iron construction resists acids or fumes in the air. When corrosion in heat transfer equipment ends, maintenance ends . . . it's as simple as that, no mystery, no magic, no "sales" talk. Your heating problems are no longer problems . . . you do away with high maintenance costs, repair work and the nuisance of leaky heating equipment.

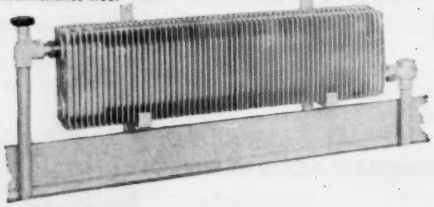
GRID Cast Iron construction eliminates the use of reducing valves where high steam pressures are used. It is designed to withstand steam pressures up to 250 P.S.I. . . . 450° temperature. GRID Cast Iron Steam Heat Transfer Surface does away with replacement costs because GRID is built to last for years . . . operating successfully without maintenance in many plants since 1929. Sounds worth looking into? Then **get the complete story today . . . come the heating season you will be glad you did.**



GRID BLAST HEATERS

Shown In Fan Assembly

A rugged, strong, and economical heat transfer surface, GRID Blast Heaters are designed for the tough job . . . for low and high steam pressures . . . require less labor for installation, less cubical space, and being designed and made the same as GRID Unit Heaters are resistant to corrosive atmospheres . . . definitely proven for years of service and maintenance-free.



GRID RADIATION

Designed for the tough applications in conjunction with high steam pressure systems, GRID Radiators eliminate the use of pressure reducing valves and because they are built with the same heating sections as GRID Unit Heaters, they will withstand steam pressures up to 250 P.S.I. . . . and wide fin spacing prevents collection of dust and dirt . . . particularly adaptable for factory, shop offices, store rooms, laboratories, etc. . . . any place where smaller heating capacities than required of a unit heater are needed.

29 YEARS MAINTENANCE-FREE SERVICE ON ALL TYPES OF GRID EQUIPMENT

Send for the complete story on GRID Unit Heaters, GRID Blast Heaters, and GRID Radiation for chemical plant use . . . it is contained in GRID Products Catalog No. 956. Write today for your copy.

D. J. MURRAY MANUFACTURING CO.

Manufacturers Since 1883

WAUSAU • WISCONSIN

OUR 75TH YEAR 1883 TO 1958

JOHN HENDRICKS

Tidewater supervision* discusses new catalog that offers . . .

New Speed for Spare Parts

Chances are that many a production supervisor finds process equipment is down longer than necessary because his plant has received the wrong spare parts. But that isn't likely to happen at Tidewater Oil Co.'s Avon, Calif., refinery, where a new materials delivery system is now proving its worth to the tune of $50,000-75,000/year by speeding the right materials to the right job at the right time.

Key to the new system is a material and parts catalog. To this has been added IBM control, improved transportation of materials for scheduled and emergency jobs, and, of course, proper supervision.

Before the system was installed a little over a year ago, parts were ordered from the storehouse by written description—as is done at many process industry plants. But the description often failed to fit the proper materials, and mechanics had to leave their jobs to obtain the materials themselves, to save time. Occasionally, men spent as much as 25% of their time obtaining materials.

The new material and parts catalog assures the delivery of the part that was requested. C. C. (Chick) Carmine, supervisor of maintenance and construction at the refinery, estimates that the number of mechanics going to the storeroom for materials has been cut by more than 80%. And he conservatively estimates that department working effectiveness has been raised by at least 5%.

By the Numbers: In the catalog, each material and equipment part has been assigned a class and a number. The number, rather than the previously used word description, pinpoints the item.

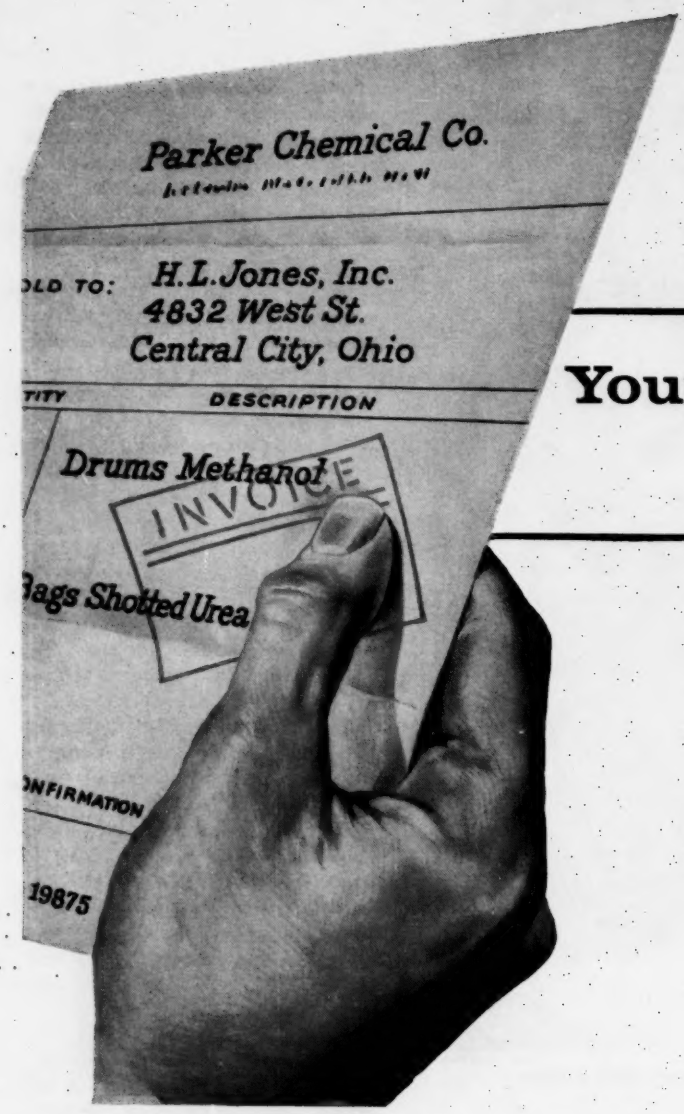
The catalog has about 800 pages, includes 55 classes and some 18,000 items. Classes include, for example, automotive parts, copper tubing and fittings (Class 1), heat exchangers and parts (Class 18), gauges, instruments and charts (Class 43), process raw materials (Class 49), containers and packaging materials (Class 50), welding supplies and equipment (Class 55).

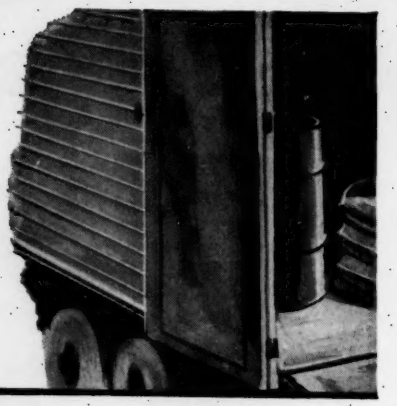
An alphabetical index, an index for each class and a table of contents (by class), all help the catalog user. For example, if a turbine part is needed, the catalog user notes in the alphabetical index that the Class 7 section should be consulted. The Class 7 index lists the various turbines by manufacturer, type and horsepower rating and the refinery's equipment tag number, and gives the page number on which details about the part may be found. The page lists the item number used for ordering the part, includes a picture or drawing of the turbine (numbered to show the location of the part on the turbine). A separate page at the end of the section gives the location of the turbine in the refinery.

Sections for some of the smaller, widely used items such as pipe fittings don't give refinery location of the part, of course. But other information, such as the material of which the part is made, is often included.

Covering the Refinery: Over 60 catalogs have been distributed to various crafts and offices in Tidewater's maintenance and construction departments, to the offices of the engineering department, laboratories, operating units, shipping department and to accounting, fire, safety and personnel offices. As additions and changes in the catalog are required, revised

*Left to right: C. C. (Chick) Carmine, Paul Woods, Louis Pedrizzetti.





Your local Du Pont high-quality

Call your local Du Pont Chemical Agent for Methanol, Urea, "Hexalin"* Cyclohexanol and "Hytrol"* O Cyclohexanone

FOR METHANOL

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CALIFORNIA
Los Angeles — Braun Chemical Co.
San Francisco — Braun-Knecht-Heimann Co

COLORADO
Denver — The Chemical Sales Co.

FLORIDA
Jacksonville — Apperson Chemical, Inc.
Miami — Biscayne Chemical Labs, Inc.
Orlando — Lenfestey Supply Company
Tampa — Lenfestey Supply Company

GEORGIA
Atlanta — Chemical Services, Inc

ILLINOIS
Chicago — Central Solvents & Chemicals Co.
Chicago — Phillips & Martin Co.

INDIANA
Ft. Wayne — Hoosier Solvents & Chemicals Corp.
Indianapolis — Hoosier Solvents & Chemicals Corp.

IOWA
Des Moines — Miller Chemical Co.

KANSAS
Wichita — Barada & Page, Inc.

KENTUCKY
Louisville — Dixie Solvents & Chemicals Co.

LOUISIANA
New Orleans — Southern Solvents & Chemicals Corp.

MARYLAND
Baltimore — Leidy Chemicals Co.

MASSACHUSETTS
Boston — Howe & French, Inc.
Holyoke — Eastern Chemicals, Inc.

MICHIGAN
Detroit — Western Solvents & Chemicals Co.
Grand Rapids — Wolverine Solvents & Chemicals Co.

MINNESOTA
St. Paul — Lyon Chemicals, Inc.

MISSOURI
Kansas City — Barada & Page, Inc.
Kansas City — Missouri Solvents & Chemicals Co.
St. Louis — Missouri Solvents & Chemicals Co.

METROPOLITAN NEW YORK
Lyndhurst, N. J. — Stoney-Mueller, Inc.

NEBRASKA
Omaha — Miller Chemical Co.

NEW JERSEY
Lyndhurst — Stoney-Mueller, Inc.

NEW MEXICO
Albuquerque — Braun Chemical Co.

NEW YORK
Albany — Eastern Chemicals, Inc.
Binghamton — Collier Chemicals, Inc.
Buffalo — Chemical Sales Corp.
New York — Stoney-Mueller Inc.
Rensselaer — Eastern Chemicals Inc.
Rochester — Chemical Sales Corp.
Syracuse — Eastern Chemicals, Inc.

NORTH CAROLINA
Durham — Cardinal Products, Inc.

OHIO
Cincinnati — Amico Solvents & Chemicals Co.
Cleveland — Ohio Solvents & Chemicals Co.
Toledo — Toledo Solvents & Chemicals Co.

OKLAHOMA
Tulsa — Ward Chemical & Supply Co.
Oklahoma City — Ward Chemical & Supply Co.

OREGON
Portland — Van Waters & Rogers, Inc.

PENNSYLVANIA
Pittsburgh — Vitro Manufacturing Co.

TENNESSEE
Memphis — Chapman Chemical Co.
Nashville — Chapman Chemical Co.

TEXAS
Dallas — Texas Solvents & Chemicals Co.
Dallas — Van Waters & Rogers, Inc.
Houston — Texas Solvents & Chemicals Co.
Houston — Van Waters & Rogers, Inc.
El Paso — Braun Chemical Co.

UTAH
Salt Lake City — Braun-Knecht-Heimann Co.
Salt Lake City — Wasatch Chemical Co.

WASHINGTON
Seattle — Van Waters & Rogers, Inc.
Spokane — Van Waters & Rogers, Inc.

WISCONSIN
Milwaukee — Wisconsin Solvents & Chemicals Corp.

FOR UREA

ARIZONA
Phoenix — Braun Chemical Co.

ALABAMA
Birmingham — F. H. Ross & Co.
Mobile — F. H. Ross & Co.

CALIFORNIA
Los Angeles — Braun Chemical Co.
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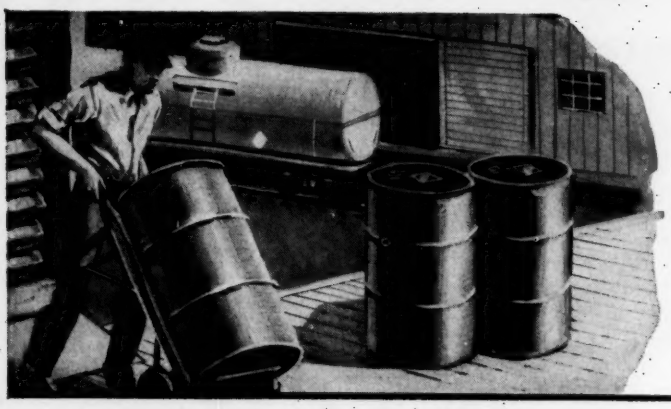

Chemical Agent offers products...in LCL quantities

He has stocks on hand for prompt delivery to you

When you order from your local Du Pont Chemical Agent, you receive chemicals of producing-plant quality . . . in *any* quantity you need. He represents many leading chemical companies and is a single source of supply for many of your chemical requirements.

Your local Du Pont Chemical Agent can supply you with several LCL orders of a variety of chemicals, in one large or small shipment. And he has the equipment, manpower and personal interest in your business to assure fast, dependable delivery of your order when it's needed . . . because he's located "just around the corner." That means you save time and simplify your bookkeeping, too!

And remember, Du Pont technical assistance is always available through your local agent . . . *he's your contact with Du Pont.* His name is listed below . . . call him today!

POLYCHEMICALS DEPARTMENT

DU PONT

REG. U. S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

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South Norwalk — Merchants Chemical Co., Inc.

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Jacksonville — F. H. Ross & Co.

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Atlanta — F. H. Ross & Co.
Columbus — F. H. Ross & Co.
Savannah — F. H. Ross & Co.

ILLINOIS
Chicago — Central Solvents & Chemicals Co.

INDIANA
Ft. Wayne — Hoosier Solvents & Chemicals Corp.
Indianapolis — Hoosier Solvents & Chemicals Corp.

KENTUCKY
Louisville — Merchants Chemical Co., Inc.

LOUISIANA
New Orleans — Barada & Page, Inc.

MARYLAND
Baltimore — Leidy Chemicals Corp.

MASSACHUSETTS
Fall River — Borden & Remington Co.
Stoneham — George Mann & Co., Inc.
Worcester — Chemical Sales & Service Co., Inc.

MICHIGAN
Detroit — Eaton Chemical & Dyestuff Co.

MINNESOTA
Minneapolis — Merchants Chemical Co., Inc.

MISSISSIPPI
Jackson — F. H. Ross & Co.

MISSOURI
Kansas City — Barada & Page, Inc.
St. Louis — Barada & Page, Inc.
St. Louis — Missouri Solvents & Chemicals Co.

NEW JERSEY
Newark — National Oil & Supply Co.
Paterson — Brown Chemical Co., Inc.

NEW YORK
Buffalo — Chemical Sales Corp.
Hicksville, Long Island — National Oil & Supply Co.
New York — Merchants Chemical Co., Inc.

NORTH CAROLINA
Charlotte — F. H. Ross & Co.
Greensboro — F. H. Ross & Co.
Raleigh — F. H. Ross & Co.

OHIO
Cincinnati — Merchants Chemical Co., Inc.
Cleveland — Ohio Solvents & Chemicals Co.
Columbus — Merchants Chemical Co., Inc.

OREGON
Portland — Van Waters & Rogers, Inc.

PENNSYLVANIA
Altoona — Western Penna. Chemical Co., Inc.
Erie — Western Penna. Chemical Co., Inc.
Middletown (Harrisburg) — Western Penna. Chemical Co., Inc.
Philadelphia — Pioneer Salt Co.
Pittsburgh — Western Penna. Chemical Co., Inc.

RHODE ISLAND
Providence — Borden & Remington Co.
Providence — George Mann & Co., Inc.

SOUTH CAROLINA
Columbia — F. H. Ross & Co.
Greenville — F. H. Ross & Co.

TENNESSEE
Chattanooga — Burkart-Schier Chemical Co.
Knoxville — Burkart-Schier Chemical Co.
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Nashville — Burkart-Schier Chemical Co.

TEXAS
Dallas — Van Waters & Rogers, Inc.
Houston — Van Waters & Rogers, Inc.

UTAH
Salt Lake City — Braun-Knecht-Heimann Co.

WASHINGTON
Seattle — Van Waters & Rogers, Inc.

WISCONSIN
Milwaukee — Merchants Chemical Co., Inc.

FOR "HEXALIN" & "HYTROL" O

CALIFORNIA
Los Angeles — Braun Chemical Co.
Los Angeles — Mefford Chemical Company
San Francisco — Braun-Knecht-Heimann Co.

ILLINOIS
Chicago — Central Solvents & Chemicals Co.

INDIANA
Fort Wayne — Hoosier Solvents & Chemicals Corp.
Indianapolis — Hoosier Solvents & Chemicals Corp.

KENTUCKY
Louisville — Dixie Solvents & Chemicals Co.

LOUISIANA
New Orleans — Southern Solvents & Chemical Corp.

MASSACHUSETTS
Boston — Howe & French, Inc.
Worcester — Chemical Sales & Service Co., Inc.

MICHIGAN
Detroit — Western Solvents & Chemicals Co.

MINNESOTA
Minneapolis — Marchants Chemical Co., Inc.

MISSOURI
Kansas City — Missouri Solvents & Chemicals Co.
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OHIO
Cincinnati — Amsco Solvents & Chemicals Co.
Cleveland — Ohio Solvents & Chemicals Co.
Toledo — Toledo Solvents & Chemicals Co.

TEXAS
Dallas — Texas Solvents & Chemicals Co.
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*Reg. U. S. Pat. Off.

FOR

HOUSE PLANTS

LAWN

GARDEN

COMMERCIAL GREENHOUSE

REODORIZED FERTILIZER!

To the packages of fertilizer and plant food designed for private lawns and gardens, house plants and commercial greenhouses, a new dimension has recently been added in the form of "aromatics". The home gardener who for years has assumed that the unpleasant odor emanating from the package or resulting from the product's wetting, was a necessary evil, is being re-educated to the era of fertilizer aromatics by a number of enterprising producers. In the D&O Industrial Odorant Laboratories, masking and reodorizing compounds have been developed for all types of commercial fertilizer, including those based on *urea, fish solubles, activated sludge, dried blood meal, animal manure, tankage, meat scraps* and *phosphate*. The successful development of such fertilizer odorants has provided an important new merchandising tool to producers... a tool that can be put to work now, for your product by the D&O industrial perfumer. Inquiries are invited.

Write for copy of article entitled "Aromatics in the Fertilizer Industry".

Essentially for You!

D&O ESTABLISHED 1798

OUR 158th YEAR OF SERVICE

DODGE & OLCOTT, INC.

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Sales Offices in Principal Cities

ESSENTIAL OILS
AROMATIC CHEMICALS
PERFUME BASES
FLAVOR BASES
DRY SOLUBLE SEASONINGS

sheets are distributed for insertion.

Insertion sheets are mimeographed at the refinery. But once a large number of corrections and mimeographed insertions have been made in any one class, and when new illustrations are required, the entire class section is sent out for reprinting, then distributed.

Phoned Orders: Material requests are phoned to storeroom, where the order is written out The material is delivered on a scheduled trip of a flat-bed or pickup truck. For emergency or unscheduled deliveries, a special truck is made available.

Records are kept on IBM cards. When depleted items reach the reorder point, the IBM machine (Type 650) automatically prepares the requisition. And, to assure that everyone is referring to the same item, the refinery's suppliers are also given a list of the item numbers used by the refinery for designation of its equipment parts and materials.

Expense and Payoff: Many hands were responsible for developing the system; it took three men and three typists four months to prepare the catalog. Total expense, including labor, material, catalog printing and truck purchase, was about $23,000.

The system is administered by Paul Woods, chief engineer, and Louis Pedrizzetti, storekeeper at the refinery, as part of their regular duties. Estimated cost of maintaining and keeping the catalog up to date: less than $200/month.

To the small plant, the system may seem elaborate and expensive. (The Avon refinery is large, has a maintenance force of about 420, covers 1,600 acres, with distances from stores to process units ranging from one-quarter to one mile.) And while many plants have numbering systems for raw materials, equipment makers' catalog numbers are often the only numbering system used for parts.

Carmine feels that a system similar to the one at Avon would pay for itself in any plant that has a maintenance force larger than 50, maintains a storeroom under formal supervision as opposed to one maintained on a help-yourself basis. Experience at Avon, where the system paid for itself in less than 12 months and is maintained for less than 5% of the labor savings, is a stronger argument in its favor.

Steam Line Savings

A new method of laying underground steam lines that can result in savings of up to 50% in construction costs has been developed by the Steam Heating Dept. of Consumers Power Co. (Jackson, Mich.). The first trial installation, which has just completed a successful eight-month service test, eliminates the need for concrete conduit and manholes.

Key to the system: an expansion joint of compact design that can be easily protected from the earth and insulation surrounding it. Use of the expansion joint—Badger Mfg. Co.'s Type S-R—permits CP to place steam line and fittings into a pipe trench, install pipe anchors, guides and supports, and pack the line with granular hydrocarbon insulation (probably Gilsonite), which is poured on the site. The line is then covered with earth, and heated to cure the insulation. The insulation remains plastic where it contacts the pipe, allows restricted movement of the pipe within the insulation.

In conventional installations, packless-corrugated expansion joints must be fitted with bulky covers to protect the bellows or corrugated elements. Granular poured-in-place insulating materials can't be used unless the joints are placed in protective manholes or encased in concrete boxes.

EQUIPMENT

Flow-Rate Controller: A unit for controlling the rate of flow of liquids is a new offering of Bowser, Inc.'s Meter Division (1300 East Creighton Ave., Fort Wayne, Ind.). The firm says flows of ½ gal. to 250 gal./minute can be controlled, with an accuracy of 0.25%, regardless of viscosity of fluids or variations in pump pressure.

•

Recorder-Controller: General Electric's Instrument Dept. (West Lynn, Mass.) is out with a new null-balance strip chart recorder-controller that features continuous standardization and unitized construction. Unit may be used for measuring and recording pH, conductivity, temperature, flow rate and pressure. It has a 10¾-in. chart width, is available in dc. potentiometer, ac. or dc. bridge types with either single- or multipen recorders.

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1959 ☐ Expect exciting new polymers from new concepts in polymerization technology. Higher toughness, water resistance and pigment binding power are indicated by evaluations and scale-up studies now under way.

1960 ☐ Expect new directions and properties for industries already using vinyls—and elsewhere as well. Their source: Today's research momentum on new catalysts, new monomers, block polymers, graft polymers and new emulsifying systems.

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Technology
Newsletter

CHEMICAL WEEK
August 23, 1958

Escambia Chemical's process for methacrylic and acrylic derivatives was revealed last week when it received a series of U.S. patents. Three, in particular, are important and basic for Escambia.

Two (2,847,453 and 2,847,465) deal with the oxidation of isobutylene with nitrogen tetroxide. This is potentially important for making the methacrylics.

The other key patent (2,847,464) deals with the oxidation of propylene (also with nitrogen tetroxide) as a means of arriving at acrylic derivatives.

No comment on plans was forthcoming from Escambia. But it appears obvious that commercialization of these patents is getting serious attention.

•

Pennsalt is starting to talk about its perchloryl fluoride. In a special announcement last week, it detailed these characteristics of the compound: It is storable, doesn't undergo decomposition, does not corrode common materials of construction, freezes at —146 F, boils at —52 F. Because of its high fluorine content and desirable physical properties, the chemical has attracted a lot of attention as a high-energy oxidizer for rocket fuels. Pennsalt reports it gives a specific impulse of 270 with hydrazine (at a chamber pressure of 500 psi.). This performance is superior to that of some more common currently used oxidizers. But it falls short of the performance attainable with straight fluorine.

•

Cyclohexamine carbonate has emerged from preliminary tests in Britain as a promising anticorrosion agent. In the government-sponsored studies, it indicated usefulness in protecting the "fire side" of boilers. It did, however, cause some pitting on mild steel. Experiments are under way now to determine how this pitting can be avoided.

•

More word on Natta's research on polystyrene is starting to emerge. In a recent issue of an Italian journal, *La Chemica e l'industria* (Milan), he reports—in two papers—encouraging results on the development of isotactic polystyrene. The catalyst system employed, for the most part, was titanium tetrachloride and aluminum triethyl. But, according to Natta and associates, the method of preparing the catalysts is a lot more important than it is in polymerizing ethylene or propylene. Also, the reaction temperature is more critical.

Crystalline polystyrene has been one of Natta's pet projects for some time. But until now, most of his published work has dealt with polypropylene.

High-purity hafnium is now being turned out in 250-lb. batches at the U. S. Bureau of Mines pilot plant in Albany, Ore. Heretofore, maxi-

mum size, produced in a smaller furnace, was 60 lbs. The scale-up, according to the bureau, hasn't reduced metal quality. Both furnaces use the same sodium-magnesium bimetallic reduction process (*CW, July 20, '57, p. 73*).

The bureau also says it is ready to let industry have its research data on making electrolytic, high-purity (99.9-plus percent) ductile chromium (potentially valuable in stainless steel alloys). Efficiency of the process was recently boosted to 44% from the 12-13% efficiency found in early experiments.

•

The chemical industry may profit by titanium research carried out largely for the aircraft industry. Lightweight alloys are of prime interest to aircraft and missile makers.

Last week Titanium Metals Corp. of America showed off a new quick-heat (to 1600 F), quick-quench process for making a sheet of titanium alloyed with 4% aluminum, 3% molybdenum, 1% vanadium. Rem-Cru, too, has been working on such thin-sheet, weldable alloys. They're designed to withstand 160,000-200,000-psi. pressures.

Rem-Cru suggests that these metals might serve for high-strength, thin-wall heat-transfer devices for the CPI. Mallory-Sharon is also exploring this equipment area, says alloys that have corrosion resistance equal to commercial pure grades may be developed. Alloys are far easier to form and handle than is pure titanium.

Currently, only the pure grades of titanium have much application in process equipment. And that has been limited by the high cost of the metal. Any titanium developments that can expand production of the metal—and increase the use of chemicals that find jobs in its extraction—would, of course, be welcomed. And with increased production, equipment makers hope, would come lower metal prices.

•

New high-temperature, corrosion-resistant graphite coatings have been developed at the nuclear research section of Minnesota Mining & Manufacturing Co.'s central research laboratory (St. Paul). Test samples resist 1800-2700 F for several hundred hours without measurable oxidation and can be immersed in boiling acids (including aqua regia) for several hundred hours without damage. The new coatings are likely candidates for jobs in the fuel element field and as moderators and structural components (such as coolant tubes, control rods, heat exchangers, etc.) for reactors. They are also being investigated as structural materials for missile and jet aircraft, according to 3M.

•

Also ready with a material that looks promising for missiles is Taylor Fibre Co. (Norristown, Pa.). It's a laminate of an asbestos mat base impregnated with a special phenolic resin and of nylon fabric impregnated with the same material. The composite material is called Grade HT-5,000. It has withstood a five-minute test at 2000 F.

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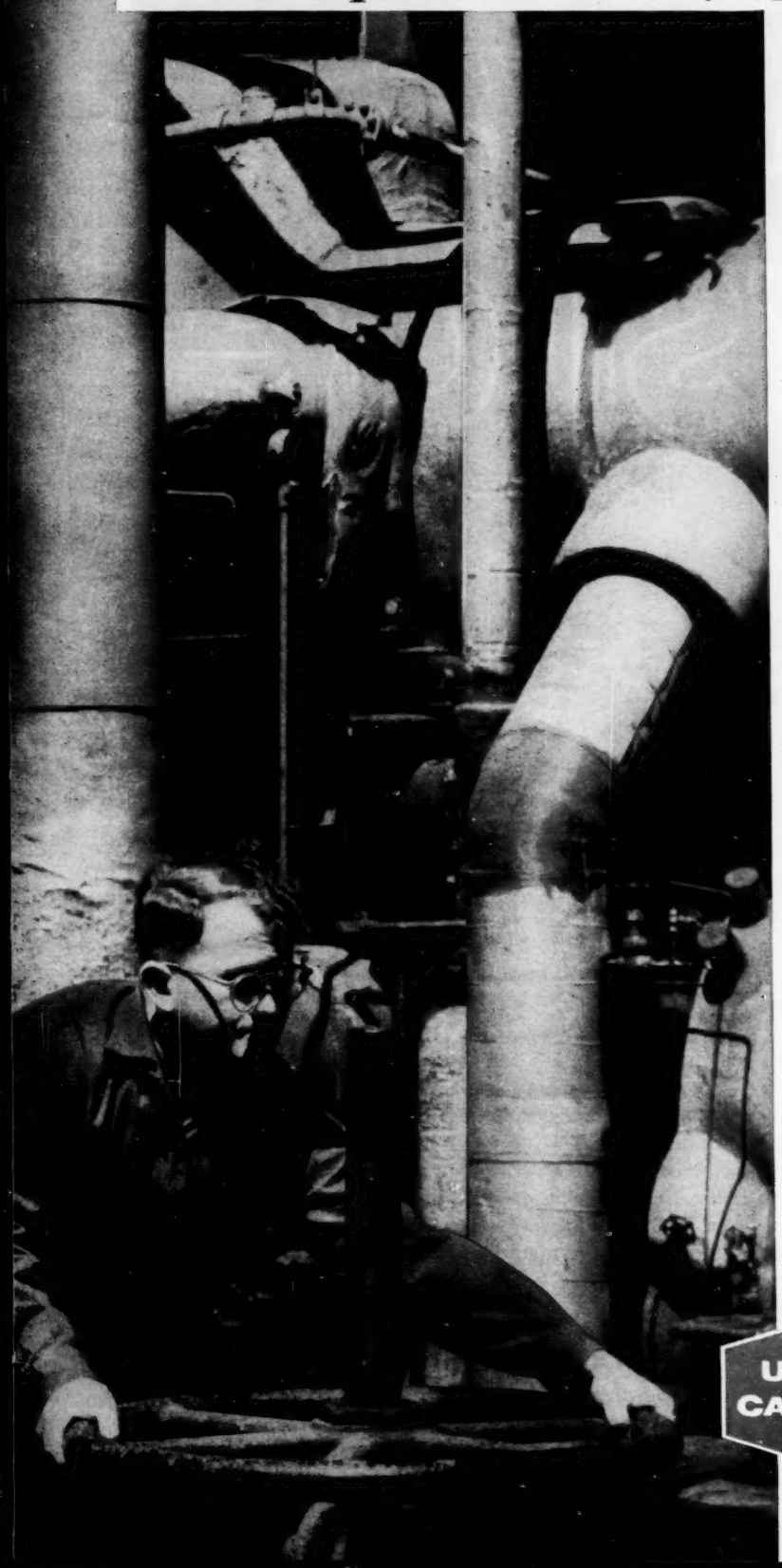

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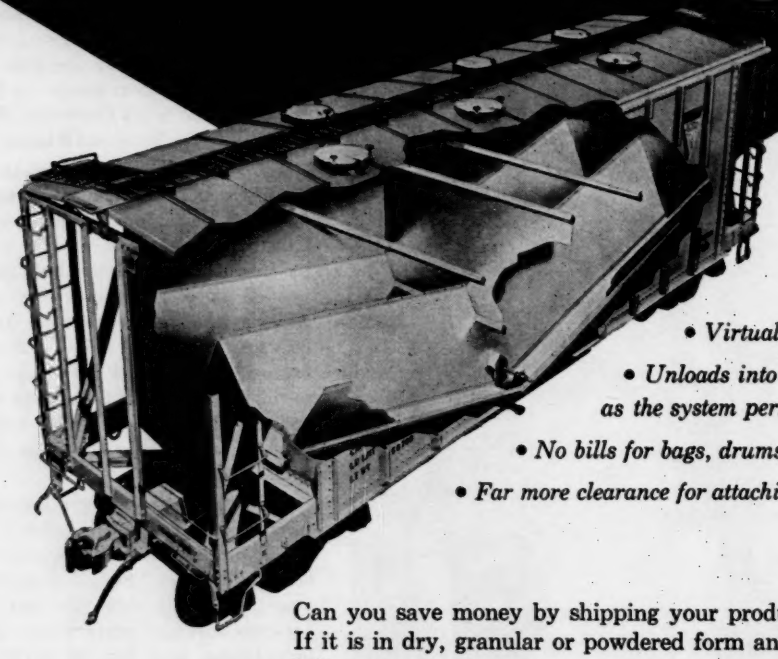

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CHEMICAL WHOLESALERS' PLANS FOR NEXT TWO YEARS

CW survey of 49 wholesalers. Figures give percent of total answering each question.

DISTRIBUTORS	Increase	No Change	Decrease	Uncertain
Manufacturing activity	55%	38%	2%	5%
Repackaging	55	37	2	6
Formulating	59	37	2	2
Warehouse space	66	22	4	8
Sales staff	76	21	0	3
Product diversification	71	10	4	15
Equipment	65	26	0	9
AGENTS AND BROKERS	**Increase**	**No Change**	**Decrease**	**Uncertain**
Manufacturing activity	19%	76%	0%	5%
Repackaging	29	71	0	0
Formulating	29	62	0	9
Warehouse space	56	40	4	0
Sales staff	62	31	0	7
Product diversification	55	19	4	22
Equipment	41	59	0	0

Middlemen Plan for Cautious Growth

Chemical middlemen are taking a confident, yet cautious, attitude toward expansion planning. That's the standout conclusion drawn from a new CW survey of distributors and sales agents. Confidence shows up sharply in seven basic areas of distributor operations. In each, more than 50% of those answering the questions plan expansion increases within the next two years (see table).

But, and here's the caution, most middlemen will concentrate expansion efforts in areas requiring little capital investment—sales staff and product-line diversification. Thus, while 76% of the respondents report plans for bigger sales staffs, only 55% will increase manufacturing activity. Agents and brokers show a similar pattern. And 71% of survey respondents expect to add to their product lines.

Distributor plans for capital spending also reveal a marked degree of caution. In line with industry's as a whole, their spending is veering downward. In '57, the average amount of capital expenditure per distributor was $67,000. This year, survey respondents will average $42,000; in '59, only $32,000. Agents and brokers, with a lesser investment in facilities, also follow the trend. Average investments: '57, $6,600; '58, $1,200; '59, $800.

Broader Scope: What percentage of distributors, agents and brokers are involved in functions other than reselling, particularly functions that often call for capital expenditure? Here's the picture:

	Distributors	Agents, Brokers
	Percent	Engaged
Formulation	68%	21%
Repackaging	73%	15%
Manufacturing	74%	12%

Normally, an agent or broker wouldn't be expected to do any of these tasks. But some 57% of the agents and brokers surveyed did function in limited capacity as distributors, thus may get into manufacturing.

Most respondents classifying themselves as distributors also were agents and brokers. This shows up in their income sources. The average distributor in *CW*'s survey derives about 9% of his sales volume from agent functions, 4% from brokerage. Some 13% of distributors' revenue stems from nonchemical items.

Although most middlemen's sales are of less-than-carload-lot (l.c.l.) quantities, substantial portions of their revenue come from bulk sales. On the average, l.c.l. sales now account for 68% of distributors' volume; bulk sales, 23%; semibulk, mixed-car and truckloads make up the remainder. Bulk sales are especially important to agents and brokers; more than 51% of the revenue of those replying comes from bulk-selling; 43% from l.c.l. sales.

Pitfalls on the Path: Whether it be via bulk or l.c.l. orders, distributors are shooting for more business—and in many cases they will require more

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SALES

DISTRIBUTORS RATE PROBLEMS

	BIG	MODERATE	LITTLE
Obtaining salesmen:	52%	37%	11%
Competition from suppliers:	28	53	18
Mixed-carload selling:	31	46	24
Competition from other distributors:	35	45	21
Sales help from suppliers:	14	48	38
Supplier credit:	5	22	72
Bank Credit:	4	20	77
Supplier cooperation in solving local marketing problems:	19	37	45
Loss of carload accounts to supplier:	19	28	53
Follow-up service by suppliers:	12	37	51

salesmen. But this is a problem. Obtaining salesmen is by far their biggest headache *(see table above)*. Over half of the reporting distributors tag it a "big" problem.

Competition from other distributors, supplier competition for the same accounts are also troublesome. Few report difficulty gaining bank or supplier credit, or getting follow-up service from suppliers.

Many of the problems in middleman-supplier relations may arise from the relative lack of clear understandings—written or oral—between the middleman and his supplier. The average distributor has clearly defined agreements with only 30-35% of his suppliers on territory definition, responsibilities to the supplier, termination of business (with the supplier) and competition for the same customers' business.

And distributors have agreements with an average of only 21% of their suppliers on the size of inventory to be carried.

Agents and brokers, in contrast, tend to operate with a more definite understanding. On the average, clear

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agreements on territory definition and responsibilities are in effect with 85% of their suppliers. And agreements to transfer carload business to suppliers exist between 34% of agent-brokers and their suppliers.

Positive Slants: Chemical middlemen eagerly seek closer—and clearer—relations with their suppliers. They also promote a policy of having producers leave less-than-carload-lot business to them. And they want producers to refrain from appointing too many wholesalers in any one area, provide better allowances and commissions. Moreover, distributors want increased marketing and technical help from their suppliers.

The best way to win these concessions from suppliers, most chemical middlemen agree, is to match up help with plans for self-improvement. And these are the plans brought out in *CW*'s survey.

DATA DIGEST

• **Container:** Folder describes new corrugated container, the DRUMpaket. Illustrations show its collapsibility, automatic top and bottom cap locking features and the reclosing operation. Gaylord Container Corp. (St. Louis).

• **Hypochlorite solutions:** Bulletin explains principles of hypochlorite solution preparation, equipment operation and specifications. Pennsalt Chemicals Corp., Washington Division (2901 Taylor Way, Tacoma 2, Wash.).

• **Alkyd resins:** 32-page brochure describes short-, medium-, and long-oil alkyds, discusses variations in oil type, content, polyhydric alcohols, poly-basic acids, and solvents and quality control tests. Typical formulations and suggested applications are also presented. Barrett Division, Allied Chemical Corp. (New York).

• **Polyglycols:** Revised edition of "Choosing the Right Polyglycol" catalogs company polyol line, suggests applications in such areas as cosmetics, urethanes, rubber lubricants, metal working fluids, surface-active agents, cold release agents and softeners. Dow Chemical Co. (Midland, Mich.).

• **Vacuum metalizing:** Coating application procedures are presented in new 16-page brochure on vacuum metalizing metals, glass and thermosetting plastics. Bee Chemical Co. (12933 S. Stony Ave., Chicago, Ill.).

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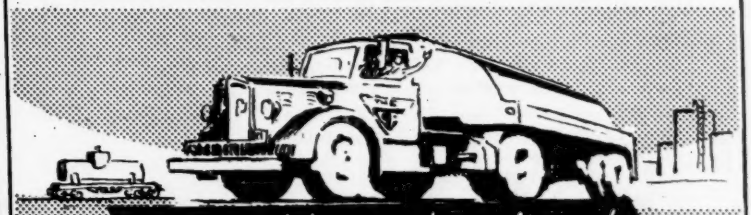

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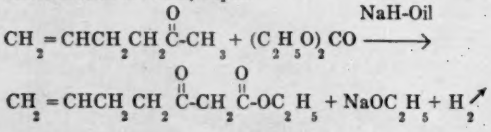

The evolved H_2, if accurately measured, provides a means of following the extent of reaction.

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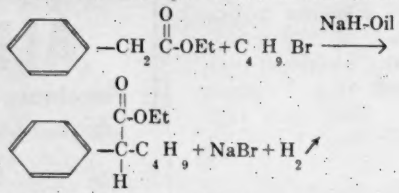
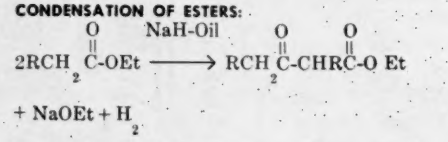
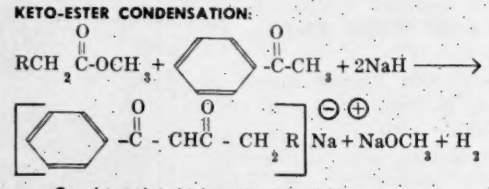
This can be accomplished by running the reaction at low temperatures in THF or a more polar solvent such as "diglyme"–dimethyl ether of diethylene glycol. The alkyl halide should be present at the start of the reaction. The technique cannot be used with Na metal.



CONDENSATION OF ESTERS:



KETO-ESTER CONDENSATION:



Complete technical information is available upon request.

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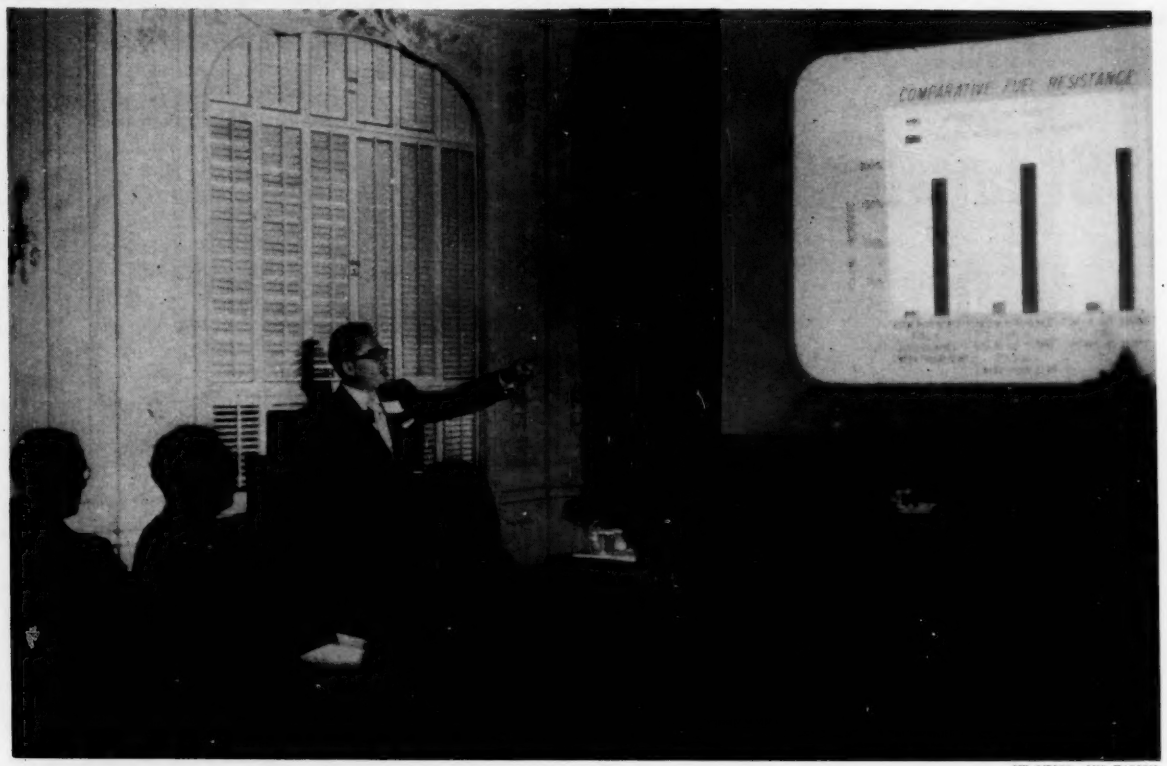

CW PHOTO—SYD KARSON

GE's Bluestein compares swelling in fuels of new nitrile silicone rubber and standard silicone.

Testing for a Key Role in Silicone Uses

Last week, General Electric unveiled what it feels is the last word in sturdy elastomers—a nitrile silicone rubber that resists common oils, fuels and solvents and is useful from —100 F to over 500 F. By year's end, GE expects to be turning out commercial quantities of the compound from facilities now under construction at its Waterford, N.Y., plant.

At an introductory price of about $15 lb., the new rubber will be competitive with the fluorine-containing polymers that so far have come closest to meeting rigid Air Force and industrial requirements (*CW, March 29, p. 39*). But the similarity ends there, according to GE.

Charles Reed, general manager of GE's silicone products department (Waterford), reports that the new rubber overcomes the limitations of its competition, and he believes its uses "will be almost unlimited." Says Reed, "The fluorinated silicones have been an outstanding development and have contributed to the solution of certain industrial and military problems. However, they have presented problems in processing, and their applications have been limited by their relatively high cost. The fluorinated hydrocarbons, while designed for elevated temperature operation, tend to soften and lose much of their physical strength at these temperatures. They also lack the low-temperature flexibility so vital to most aircraft applications."

He adds that the nitrile silicone not only will retain desirable physical properties over a wide temperature range but also will be easy to process in ordinary rubber fabricating equipment and will be, basically, a lower-cost material than other high-temperature, oil-resistant rubbers.

As a case in point, Reed cites an aircraft industry target specification for a sealant for integral fuel tanks that must withstand temperatures from —65 F to 350 F. Reed thinks that the nitrile silicone rubber will qualify, doesn't know of another material that has made the grade.

Chemical Key: Silicone technologist Ben Bluestein reveals that to synthesize the new silicone commercially requires a supply of an extremely pure nitrile intermediate. Less than 0.01% of certain impurities can be detrimental to the properties of the final rubber.

"This pure nitrile intermediate," Bluestein reports, "is first converted into a fluid by hydrolysis and then into a very-high-molecular-weight polymer. The long-chain polymer is converted into a rubber by conventional techniques. It is mixed with a filler (e.g., silica) and a vulcanizing agent (such as benzoyl peroxide). It is then heated in a mold to produce a rubber. Other ingredients (such as pigment) may be added."

Developments in silicone polymers have come thick and fast in the past

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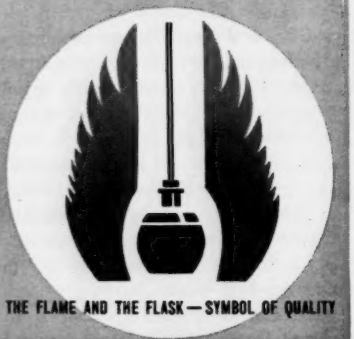

THE FLAME AND THE FLASK—SYMBOL OF QUALITY

The C. P. Hall Co.
CHEMICAL MANUFACTURERS
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RESEARCH

few years, and chances are that no one polymer will dominate all applications. GE is betting that its nitrile silicone comes the closest to it.

EXPANSION

• Haloid-Xerox Inc. (Rochester N.Y.) will bring its research entirely under one roof by building a new multimillion-dollar lab this fall.

• Petroleum Technologists Inc. (Dallas) will occupy its newly completed Dallas laboratory this October. The firm does core analysis and reservoir fluid studies for the petroleum industry.

• Robertshaw-Fulton Controls Co. (Richmond, Va.) broke ground at King of Prussia, Pa., for its fifth research center. It will be staffed by 100 personnel.

• Scott Paper Co. (Chester, Pa.) will build a new research lab in Philadelphia as part of a $10-million consolidation project of its facilities. The new lab will triple its research space.

• Metals Research and Development Corp. (Scranton, Pa.) will add a wing to its laboratory at Exeter, Pa., will expand research facilities for metal powder rolling work.

• Texas A&M University (Austin, Tex.) is readying a $3-million nuclear research center. It's expected to be completed in 18 months. Initial studies will include food irradiation, rate of healing of injuries treated by irradiation and materials testing.

• General Aniline & Film Corp. (New York) has moved the major part of its Dyestuff and Chemical Division's technical laboratory from New York to Easton, Pa. The company's pigment laboratory now in New York will be moved to a plant site at Linden, N.J.

• Du Pont's (Wilmington) polychemicals department has formed a Research and Development Division, which will consolidate functions of its old research division and the technical section of the department's manufacturing division.

PRODUCTS

Doubly Labeled Radiocompound: L-methionine (methyl $C^{14}D_3$), an amino acid labeled with C^{14} and deuterium, is available from Research Specialties Co. (Berkeley, Calif.). Suggested use: study of the mechanism of ergosterol.

Antibiotic: A new tetracycline derivative, Reverin (pyrrolidinomethyltetracycline), reportedly almost free of side reactions, has been developed by Farbwerke Hoechst AG. (Frankfurt, Germany). The antibiotic showed activity against infections induced by tetracycline-sensitive microorganisms.

•

Insulator: Pirelli (Milan, Italy) has developed a new insulator called Voltalir, which will reportedly withstand up to 400,000 volts.

•

Pleater Process: The Wool Bureau Inc. (New York) reports that a new wool pleating process employing ammonium thioglycolate, and marketed under the tradename Si-Ro-Set Concentrate, is now available in the U.S.

•

Insulator: A new foam insulating material composed of Freon and urethane has been developed by General Motors Corp.'s Frigidaire Division (Dayton, O.). Suggested use: in refrigerator and freezer unit walls, where it reportedly allows for a 50% enlargement of capacity without an increase in box size.

•

Synthetic Rubber: Diene is the latest addition to Firestone Tire & Rubber Co.'s (Akron) family of synthetic rubbers. It may be available for this year's tires.

•

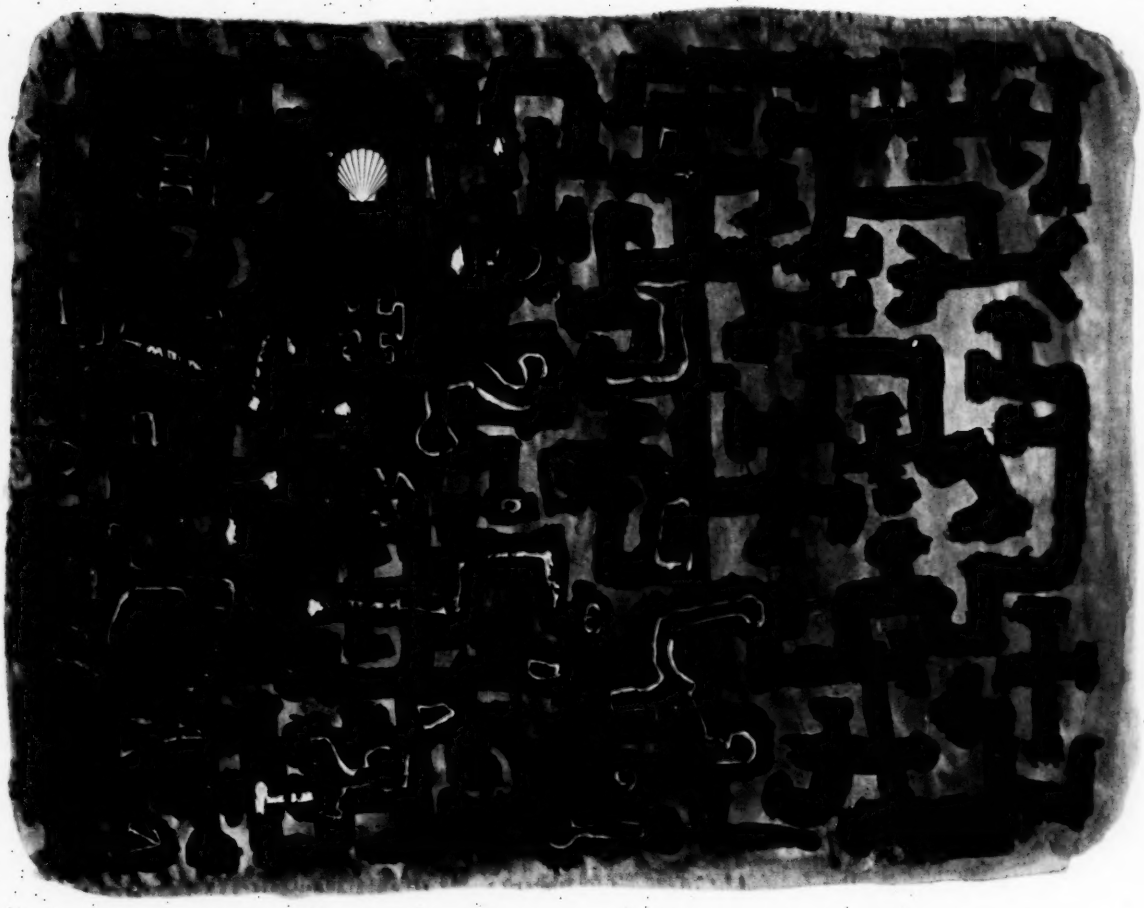
Fine Chemicals: Hummel Chemical Co. (New York) is a new supplier of cobalt acetate, cobalt oxide, and nicotine sulfate.

•

Growth Booster: A new hormone product, the first developed specifically to produce weight gain in heifers, will shortly be available from E.R. Squibb & Sons (New York). Developed jointly by Syntex Animal Products, a division of Foundation Laboratories (New York) and Squibb, the product is called Synovex-H. It reportedly will increase heifer weight gain at a rate of 20-30%, improve feed efficiency 15-20%. Cost: $1.63 per head.

•

Radiation-Resistant Fluids: Monsanto Chemical Co. and Shell Development Co. have developed a high-temperature and radiation-resistant fluid, polyphenyl ether. It reportedly will remain liquid in temperatures from 20 to 800 F.



REACTIVITY—an interpretation by Hoot VZ

How can you use these Shell chemicals?

MANUFACTURERS of a wide variety of products are finding an increasing number of uses for these chemicals.

The products we have listed at the right may be helpful in your particular operation if you produce pharmaceuticals, adhesives, dyes, resins, pesticides or lubricating oil additives. They are available for shipment in quantities from a drum to a tank car.

Your Shell Chemical representative will gladly give you more information. Samples and technical literature are available on your letterhead request.

- Allyl Alcohol
- Allyl Chloride
- Bisphenol A
- Cyclohexane
- Dimethyl Ketone
- Epichlorohydrin
- Ethyl Chloride
- Methyl Isobutyl Carbinol
- Styrene Monomer

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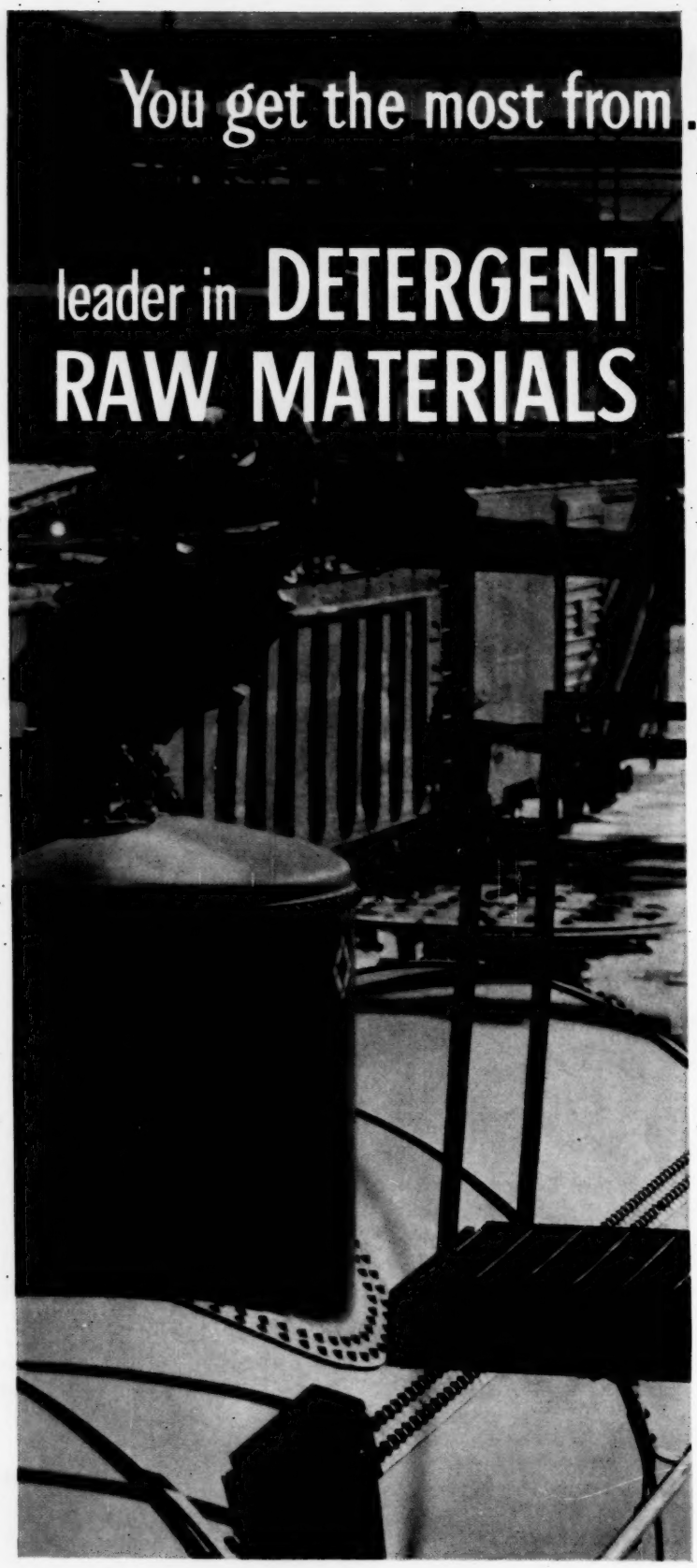
SHELL



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BIGGEST in BENEFITS

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Monsanto, producer of alkyl benzene and phosphorus, offers you the broadest line of surface active agents, phosphate salts and other detergent raw materials of *high quality* to meet *your* requirements. Materials are produced at more than one plant, protecting you against costly shipping delays.

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Monsanto's Detergent Product Line Includes:

Alkyl Benzene	**Surface Active Agents**
Phosphoric Acid	DDBSA
ACL* 85-70	Santomerse* (Anionic)
Phosphate Salts	Sterox* (Nonionic)

Bag, drum, tank car or carload, Monsanto supplies detergent raw materials in *any* quantity from a conveniently located plant, warehouse or through a national network of service-minded distributors. Phone Monsanto:

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St. Louis 24, Missouri

YOUR "BIG BENEFIT" SOURCE FOR PHOSPHATES, DETERGENT RAW MATERIALS, SILICAS, ACIDS AND HEAVY CHEMICALS

Market Newsletter

CHEMICAL WEEK
August 23, 1958

Here's more on the phthalic anhydride price situation that was fired to a boil by newcomer Amoco Chemical's recent statement that it will sell anhydride at 4¢/lb. under the going market price—21¢/lb. (*CW Market Newsletters, Aug. 2; Aug. 9*). Most other major producers are quietly notifying customers that when phthalic of comparable quality is sold and delivered at a lower price by a "competitor" they will match that tag.

The move appears to be, but may not be, a retreat from the earlier resolve to sit tight with the 21¢/lb. quote. There's still a great deal of doubt in the trade that Amoco will be anywhere near ready to deliver until sometime in '59. Chances are that the 21¢ price will be good for at least several months.

Now, the possibility of a price cut gives phthalic-from-napthalene sellers a talking point when potential—but reluctant—'59 contract customers point to Amoco's 17¢ price and ask why they should sign at 21¢.

The same situation prevails in the isophthalic acid market. Oronite (at present the only U.S. producer of iso) has already circulated word among its customers that it will cut its 22¢ price when Amoco's upcoming material is marketed at the announced mole equivalent price of 15.2¢/lb.

Although Amoco's pricing advantage has been blunted by its competitors' actions, it has reaped one bonus by stirring up the ruckus: there probably isn't a phthalic or isophthalic user in the country that isn't aware that Amoco is a new source of supply. Says one observer: publicity-wise, it was a brilliant stroke of salesmanship.

•

Xylene prices this week are down by as much as 5¢/gal. It was reported here more than a month ago (*CW Market Newsletter, July 19*) that such a move was coming, although other periodicals have been insisting that "no change in xylene prices is expected in the near future."

The recent tense international situation generated some hesitation to cut tags. But growing competition from lower-cost substitute solvents and weakening in other aromatics prices (notably benzene) were enough to knock the props from under both coal tar- and petroleum-derived xylene.

Some typical new tank-car tags: (coal-tar material), at Gary, Ind., prices are down to 29¢/gal. from 34¢; (petroleum), at Baytown, Tex., down to 27¢ from 31¼¢/gal.

•

Urea solutions are being produced on the West Coast for the first time. Shell Chemical is now turning out three grades at its 40,000-tons/year urea plant at Ventura, Calif. Two products are 50% concen-

tration materials designed for direct application to crops; one of these—a special low-biuret grade (0.3% on solids basis)—is aimed at foliar spray application. The other is for soil application by injection, irrigation and sprinkler methods. The third grade is an 80% concentrate; it's shipped hot to fertilizer formulators, who use it to make liquid fertilizers.

Hard on Shell's heels is Hercules Powder, which plans to produce urea solutions at its new, 20,000-tons/year urea plant at Hercules, Calif. The plant should be onstream within 30 days.

Pentachlorphenol capacity has been doubled at Reichhold Chemicals' Tacoma, Wash., plant—the only penta unit in the Pacific Northwest. Bulk of the increased output is slated for treating of wood. One major telephone pole producer reportedly is doubling the amount of penta it uses to treat poles; Reichhold's expansion reflects, in part, this increased demand.

•

A large oxygen generating plant, built by Air Products (Allentown, Pa.), is being leased for 15 years to Granite City Steel (Granite City, Ill.). The unit will provide about 60 million cu. ft./month of oxygen.

Most of the new supply is piped to open-hearth furnaces to increase flame temperature and accelerate removal of carbon from molten steel. Increased use of oxygen is one method being used to raise Granite City's steelmaking capacity to a high of 1,584,000 tons/year in '59.

•

Substantial price cuts on rubber antiozonants (additives that prevent rubber from cracking) are reported by Universal Oil Products. Delivery price east of the Rocky Mountains for each of two additives (UOP 88 and 288) is down 19¢/lb., to $1.07/lb. in less than truckload quantities, $1.05/lb. in truckloads. Prices are slightly higher on the West Coast.

•

Price cuts on nylon staple fiber, effective immediately, are listed this week by Industrial Rayon. Tabs on 15- and 22-denier materials are down 12¢/lb., to $1.08; on 8-denier material, down 5¢/lb., to $1.15. Prices apply to bright, semidull and dull fibers. Price of 3- and 6-denier nylon staple fibers remains at $1.28/lb.

SELECTED PRICE CHANGES — WEEK ENDING AUGUST 18, 1958

	Change	New Price
DOWN		
Litharge, coml. powd., bbls., c.l., wks., frt. equald.	$0.0025	$0.1250
Methyl parathion, tech. 80%, dms., frt. alld. E.	0.06	1.12
Platinum metal, works, oz.	1.00	57.00
Tin metal (Straits)	0.01125	0.9425
Xylene, coal tar, indust., tanks, works, Chicago dist., gal.	0.05	0.29
Xylene, petroleum, indust., tanks, works, Bayonne, N.J., gal.	0.04	0.29

All prices per pound unless quantity stated.

INTRODUCING

Versamid 140

another **new liquid** polyamide resin from General Mills!

From General Mills' continuing resin research program comes a new member to the growing polyamide family . . . *Versamid 140*. Field-tested, it is now commercially available. This *epoxy-reactive polymer* has already proven itself in:

- **casting and tooling**
- **adhesives**
- **potting and encapsulating**
- **reinforced laminates**
- **coatings and concrete toppings**
- **other epoxy-based products**

Look at these five big advantages:

Low Viscosity	Good Heat Distortion Point	Long Pot Life	Low Shrinkage	Fast Cure Time
150±25 poises at room temperature—low enough to simplify glass laminate making, with new and greater weather and impact resistance.	Ranges from 160° F. to 240° F. (depending on the epoxy used.)	Varies from 60-90 minutes in ½ gallon batches (depending on the epoxy used.)	Extremely low! Permits excellent reproduction of mold surfaces of large castings.	Versamid 140-epoxy blends will cure in 20 minutes at 300° F. Cures may also be obtained at room temperature within 24 to 72 hours.

Typical physical properties of Versamid 140:	
	Amine value ——— 350-400
	Viscosity, 25° C. (poises) ——— 125-175
	Color-Gardner ——— NDT 12

Like other Versamid polyamide resins, *General Mills' new Versamid 140* provides tenacious adhesion to a wide variety of substrates, outstanding impact and corrosion resistance, permanent *internal* flexibility, and non-toxicity.

For full details on Versamid 140, write for Versamid Technical Bulletin 11G and your evaluation sample. Address to: Dept. CW-8, Chemical Division, Kankakee 3, Ill.

Sales Offices:
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CHEMICAL DIVISION

General Mills

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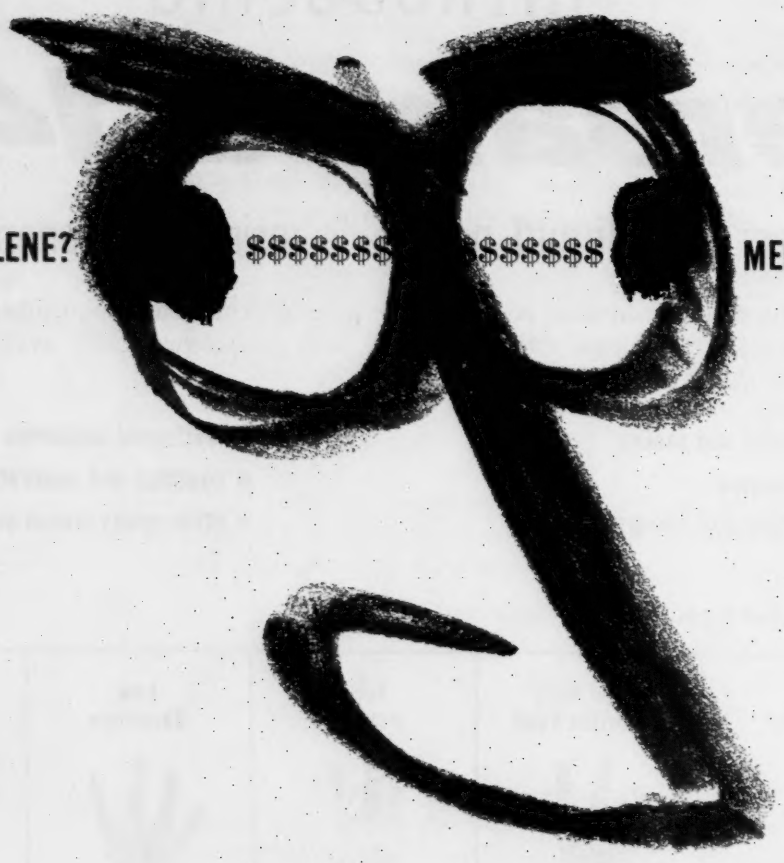

● With the ever increasing demand for ethylene, now is the time for producers to take a long look at naphtha—a raw material that is not only practical but rapidly becoming more and more plentiful.

● Kellogg offers an unequalled background in processes and plants for the production of high-purity ethylene directly from naphtha and other liquid petroleum fractions, as well as for the recovery of ethylene.

● Utilizing its unique steam pyrolysis process, Kellogg has engineered and built nine ethylene-from-naphtha plants for leading chemical manufacturers in various parts of Europe.

● In the U.S.A. Kellogg has engineered and built a naphtha cracking plant on the Gulf Coast, and has made several economic studies in this country on naphtha and other liquid feedstocks for ethylene.

● Kellogg welcomes the opportunity to discuss with you in detail the many advantages of its steam pyrolysis process.

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CW REPORT

1. All-out attack from government antitrusters.
2. Public antagonism on "high" drug prices.
3. Higher-than-ever costs for research, marketing.
4. Increasing competition in foreign markets.

1954

1955

1956

1957

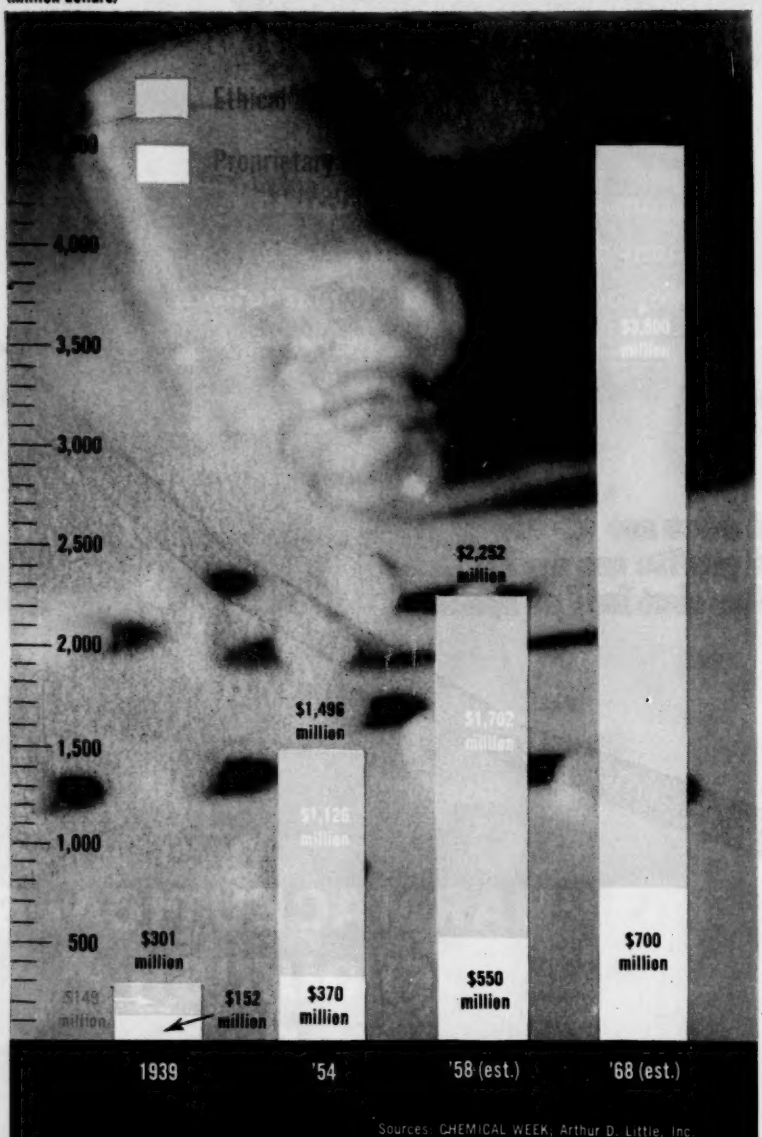
1958

PHARMACEUTICALS FLOURISH UNDER FIRE

by John Rivoire

Prognosis for the Pharmaceuticals Industry

Sales should hurdle the $2.25-billion mark this year and double to $4.5 billion by 1968. Ethical drugs, which now command 75% of the drug market, should push their share to 85% in '68.



Sources: CHEMICAL WEEK; Arthur D. Little, Inc.

It's at once the best of times and the worst of times for the pharmaceuticals industry. Last week, drug company financial vice-presidents were viewing with pleasure their companies' better-than-most-industry sales and profits records for the first half of '58. Simultaneously, the industry's legal brains were defending its members against the government's antitrust broadsides—the latest being the charges leveled at five major antibiotics producers earlier this month (*CW, Aug. 9, p. 21*).

The economic pulse of the pharmaceuticals industry at its moment of trial is good. Total ethical drug sales this year will probably hit an all-time high of $2.25 billion, up $5 million over '57. Sales of ethical products, amounting to roughly 75% of all pharmaceuticals sold, may reach $1.7 billion this year, while proprietaries hold their '57 level at $550 million. Drugmakers will likely see their industry double in dollar size by '68, reach $4.5-billion/year sales —$3.8 billion (85% of the '68 market) in ethicals, $700 million in proprietaries. Output of the industry is expected to gain 39% by '63. This compares with an expected output growth of 30% for all chemical process industries and 37% for chemicals and allied products.

Despite the pressures of recession, drug industry net sales and net profits increased in '57. The average sales gain made by 19 key companies in '57 was 13%; profits were up 19%. Again in the first six months of this year, the same 19 companies turned in sales and profit hikes of 5% and 1% respectively (*see charts, p. 90*).

These first-half gains are small, but they're significant, for pharmaceutical makers' group is the only one in the CPI that has shown any sales and profits increases so far this year.

Damping this cheery outlook, of course, are the drug industry's troubles with government antitrusters, who are busy probing drugmakers' marketing practices. The outcome might well have a profound effect on drug companies' future sales and profits. Here's the legal situation:

ANTITRUST TROUBLES

A federal court in Trenton, N.J., is hearing arguments on Justice Dept.'s antitrust charges alleging price-fixing conspiracy among the five Salk polio

vaccine makers (Lilly, American Home Products, Merck, Pitman-Moore and Parke, Davis) on sales to government agencies. Justice Dept. alleges that identical bids were made to federal agencies over a two-year period (1955-1957) and that pressure was brought by individual producers to get Salk polio vaccine distributors to bid on federal, state and local government contracts at the same prices offered by the manufacturers.

In a "fair trade" case, Parke, Davis won dismissal (first in a federal district court and then in a court of appeals) of charges alleging price-fixing of vitamins sold by retail outlets in Virginia and in the District of Columbia. But P-D's troubles aren't over yet. Justice Dept. is likely to appeal to the Supreme Court. The dismissal upholds, for the time being, the right of a manufacturer to enforce resale price maintenance within a state.

Following a series of state court rulings upsetting state "fair trade" laws, the drug industry asked Congress this year for a new federal law permitting manufacturers to enforce resale price maintenance on a nationwide basis. After lengthy hearings, Congress pigeonholed the bill. The industry still hopes for passage of a bill next year.

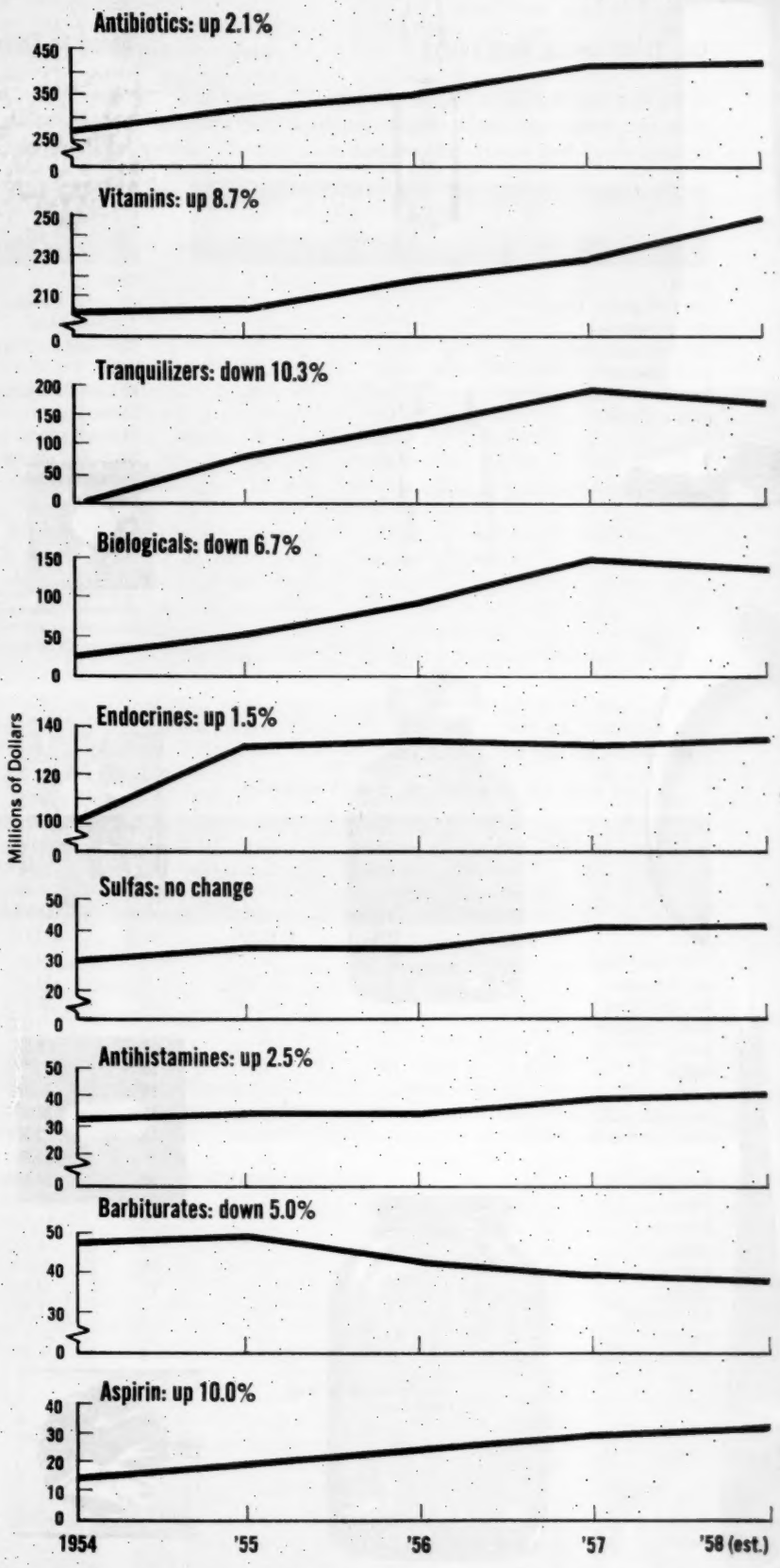
Just this month, at the same time it issued its long-awaited economic report on antibiotics, Federal Trade Commission filed charges blasting five other major companies (Bristol-Myers, Lederle, Pfizer, Upjohn and Squibb). FTC says they conspired to fix and maintain excessive prices for their tetracycline broad-spectrum antibiotics. It charges that Pfizer acquired its key tetracycline patent by submitting false information to the Patent Office and that the other four firms withheld information from the Patent Office that would have destroyed Pfizer's patent chances. All five must answer charges by Oct. 1 in New York's federal court.

Those three big cases aren't all the legal troubles the industry faces. A House investigating committee headed by Rep. John Blatnik (D., Minn.) recently held public hearings into complaints about advertising claims made for proprietary drugs, viz. weight-reducing nostrums promoted directly to the public and sold over-the-counter. Result: a "no white coats"

Record of the Big Ethicals

Sales records from 1954 through '58 (estimated) of nine selected key drug groups, which account for 75% of all bulk ethical drug sales.

Source: Arthur D. Little, Inc.



How Healthy Is the Drug Industry?

One Gainer Among Many Losers

In the first half of 1958 vs. '57, the drug industry racked up gains in net sales and profits despite general industry-wide declines. Here's how industry performances compare.

	Percent Change	
	Net Sales	Net Profits
Drugs	+ 5	+ 1
Chemical process industries	— 9	—35
All manufacturing	—13	—40
Chemicals and allied products	— 6	—25
Basic chemicals	— 9	—25
Petroleum and coal industries	—10	—30
Rubber	—11	—45
Paper	— 1	—25
Ceramics	—18	—55

Sources: U.S. Dept. of Commerce; CHEMICAL WEEK.

Ahead on Three Key Counts

When it comes to (1) spending for research, (2) scoring in sales of new products, and (3) showing pretax profit gains, the drug industry far outranks other process industries. Here's the record.

	Research Spending*	Share of Future Sales Expected from New Products†	Pretax Profit Gains‡
Drugs	$5.00	23%	84%
Industrial chemicals	3.70	15	23
Synthetic fibers	3.64	18	1
Chemicals and allied products	2.26	16	36
Glass	2.09	8	59
Fertilizers and minerals	1.80	5	17
Rubber	1.44	5	15
Chemical process industries	1.22	8	24
Soaps, fats and oils	1.02	10	34
Petroleum refining	.85	2	15
Ceramics	.76	8	37
Paper	.44	9	13
Cement	.40	0	41

***Expressed in dollars/$100 of net '57 sales.**
†Estimated new-product sales expressed as a percent of estimated '60 sales.
‡Expressed as a percent change 1955-57 average vs. '53.
Sources: CHEMICAL WEEK; McGraw-Hill Dept. of Economics.

How Companies Are Doing This Year

The net sales and net profits record of 19 companies.

	Net Sales 1957 (million dollars)	Net Sales Percent Change '57 vs. '56	Net Sales 1st Half '58 (million dollars)	Net Sales Percent Change 1st Half '58 vs. 1st Half '57	Net Profits 1957 (million dollars)	Net Profits Percent Change '57 vs. '56	Net Profits 1st Half '58 (million dollars)	Net Profits Percent Change 1st Half '58 vs. 1st Half '57
Abbott	$ 111,271	15%	$ 56,571	10%	$12,681	17%	$ 5,714	12%
Allied Laboratories	31,296	38	12,203	—18	3,612	39	671	—59
Am. Cyanamid	532,479	6	257,384	— 1	51,348	16	19,227	—17
Am. Home Prod.	347,249	18	203,238[2]	10	38,618	24	21,029	10
Baxter Laboratories	23,783	81	12,423	7	1,062	71	631	40
Carter	42,470[1]	2	22,780	1	5,595[1]	25	3,239	106
Cutter	16,185	18	9,937	14	534	184	475	49
Lilly	199,801	10	87,700	—13	32,297	7	11,700	—34
Merck Sharp & Dohme	186,937	8	101,492	11	23,094	14	14,035	20
Miles Laboratories	48,951	15	26,437	18	3,506	42	1,765	34
Norwich	33,478	13	16,896	9	3,942	17	1,724	7
Parke, Davis	162,288	21	83,211	10	27,930	58	13,405	21
Pfizer	207,152	16	106,943	9	22,909	26	11,583	15
Schering	80,692	12	37,837	— 3	15,365	11	5,861	—13
Searle	30,597	9	16,352	9	6,923	5	3,695	11
Smith Kline & French	115,489	10	61,374	10	20,553	9	10,429	7
Sterling	198,703	12	104,849	11	18,815	11	8,778	8
U.S. Vitamin	13,453	8	6,917	5	1,723	15	823	0
Warner	157,888	15	71,335	2	14,330	25	5,669	2
Total of 19 companies	2,540,162	13	1,295,979	5	304,837	19	140,453	1

[1] Fiscal year ends in March.
[2] Gross sales.

provision in the national television advertising code. In late June, FTC filed a complaint against producers of four sold-over-the-counter weight-reducing preparations for alleged misrepresentation in advertising claims. And FTC is also firing at tranquilizer promotion to physicians, charging that the ads inform doctors only of favorable clinical data.

Blatnik's committee is now considering probing, probably next year, into television and other advertising for aspirin and competing drugs.

Attacking Antagonism: Much of the pharmaceutical industry's antitrust and "fair trade" troubles stem from adverse public feeling about the "high" cost of some antibiotics. What is the industry doing about this public antagonism? One important move occurred earlier this year when American Drug Manufacturers' Assn. merged with American Pharmaceutical Manufacturers' Assn. to form Pharmaceutical Manufacturers' Assn., which will now speak for the industry in trying to create a more-favorable image of the industry.

Various companies will probably step up their own public relations programs. Two weeks ago, Pfizer took the lead, said it will soon launch an advertising program in several national consumer magazines.

That's where the pharmaceutical industry's antitrust and public relations headaches stand at the moment. Here's how the big markets for ethical drugs are faring against these disturbing elements:

SPOTLIGHT ON MARKETS

Total drug industry sales in '39, were split, roughly 50-50, between ethical products (promoted to doctors) and proprietaries (promoted to the public). Total drug product sales amounted to $301 million—ethical sales, $149 million; proprietaries, $152 million.

This year, total drug sales are expected to hit a high of $2.25 billion, of which $1.7 billion will be in ethicals and $550 million in proprietaries. Ethicals are the fast-growing market and the big money-makers; they claim the heaviest outlays of research and development dollars. Pharmaceuticals industry spending on all research and development runs about 5-8% of sales in most companies and goes above 10% in some. This compares with an all-industry average of about 1% of sales revenue earmarked for research and development.

In '57, total spending on pharmaceutical research and development hit about $130 million and may well exceed $150 million this year. About 10% of all R&D dollars go outside of company laboratories, to research institutes, hospitals, educational institutions and commercial labs and consultants.

Four key factors will be responsible for growth of sales in the next 10 years: (1) rapidly increasing U.S. and world populations, up 1.7% annually; (2) higher per-capita income, with bigger individual and family outlays for medical care; (3) greater emphasis on animal health and nutrition to meet the food requirements of larger populations; (4) stepped-up attack on still-unconquered ailments and diseases.

Right now, nine big ethical groups account for 75% of all ethical drug sales. Ranked in order of size, these groups will rack up sales something like this in '58: antibiotics, $431 million; vitamins, $250 million; tranquilizers, $175 million; biologicals and endocrines, $140 million apiece; sulfas, $42 million; antihistamines, $41 million; barbiturates, $38 million; aspirin, $33 million.

What's happening in these key markets today and where are they heading? Below is a detailed analysis of each of these big ethical groups. The table on p. 92 shows how the 32 large pharmaceutical producers figure into these nine big areas.

Antibiotics: Antibiotics now add up to at least 25% of all ethical drug sales. Estimated '58 antibiotics sales: $431 million, up 2.1% from '57. This year's sales should break down like this: broad-spectrum products, $271 million (63%); penicillin, $90 million (21%); streptomycin, $30 million (7%); other antibiotics, $40 million (9%).

In the big broad-spectrum group, tetracycline compounds are far out front, account for about 57% of all broad-spectrum sales volume. Lederle's tetracyclines, Achromycin and Achromycin V, are the leaders, followed by Parke, Davis's Chloromycetin, which has made a strong comeback in the past few years.

Antibiotics sales in the past five years have increased 210%, from $138.4 million in '53 to an expected $431 million this year. By '68, their sales will likely have reached $750 million/year, an increase of 74%. That outlook anticipates new and extended applications of antibiotics for the treatment of respiratory diseases, animal health, perhaps some types of cancer.

There's little anticipation in the pharmaceutical industry that new antibiotics of the importance of penicillin, tetracycline or chloramphenicol will be developed in the near future. So, drugmakers will be placing greater emphasis on refining and combining existing antibiotics.

Despite the dearth of new developments, antiobiotics production is still attracting newcomers. Schering is building a $1.5-million R&D laboratory and pilot plant in Union, N.J., which may put Schering squarely in antibiotics competition.

Now, with a host of powerful antibiotics to choose from, producers have greater opportunity to turn out combinations of antibiotics. One of the problems to be licked: the developing resistance of disease microorganisms. Another approach: addition of antihistamines, vitamins, tranquilizers and synergists to antibiotics, forming new drugs that not only attack the basic ailment but also relieve associated conditions and symptoms.

Pfizer's new Cosa line of broad-spectrum antibiotics is the most recent significant example of a new type of combination approach. The products contain glucosamine added to tetracycline, oxytetracycline (Terramycin) and Signemycin — three of Pfizer's major antibiotic products. Addition of glucosamine sustains the high blood concentration levels. Introduced only six months ago, the Cosa products already show significant market penetration.

In research and development areas, antibiotics producers are (1) exploring new combinations of antibiotics with other types of drug compounds, (2) investigating new sources of antibiotics — e.g., bacteria, (3) re-evaluating antibiotics that have been judged unusable in human therapy for possible use against animal and plant diseases, (4) evaluating new and old antibiotics for human therapy, especially against cancer.

Antibiotics exports now amount to

Which Companies Compete in What Markets

A quick reference to the main competitive interests of 32 big ethical drug producers in nine major ethical drug markets. ▭ indicates current major interest. ▬ indicates one of the four major marketers.

	Antibiotics		Sulfas, Combinations	Tranquilizers, Hypotensives	Vitamins
	Penicillin, Streptomycin	Broad-Medium-Spectrum			
Abbott	▭				▬
Allied Laboratories					
Am. Cyanamid (Lederle)		▬	▬		
Am. Home Prod. (Ayerst & Wyeth)	▭			▬	
Bristol Labs.	▬				
Burroughs Wellcome					
Carter (Wallace Labs.)					
Ciba				▭	
Cutter					
Endo					
Hoffmann-LaRoche			▬		
Lakeside					
Lilly	▬				▬
Mead Johnson					▬
McNeil					
Merck Sharp & Dohme					
National					
Olin Mathieson (Squibb)	▬			▬	
Organon					
Parke, Davis	▬	▬	▬		▬
Pfizer (includes Roerig)	▬	▬			
Riker					
Robins					
Sandoz					
Schering			▭		
Searle					
Smith Kline & French			▬	▬	
Upjohn		▬			
U.S. Vitamin					
Vick (Merrell)					
Warner					
Winthrop (Sterling)					

a healthy $100 million/year and will probably have grown to about $150 million/year by '68.

Vitamins: Another large and fast-growing ethical product group, vitamins and hematinics are approaching '58 sales of $250 million, up about 8.7% over '57. Nutritional products of this kind account for 15% of all ethical drug sales.

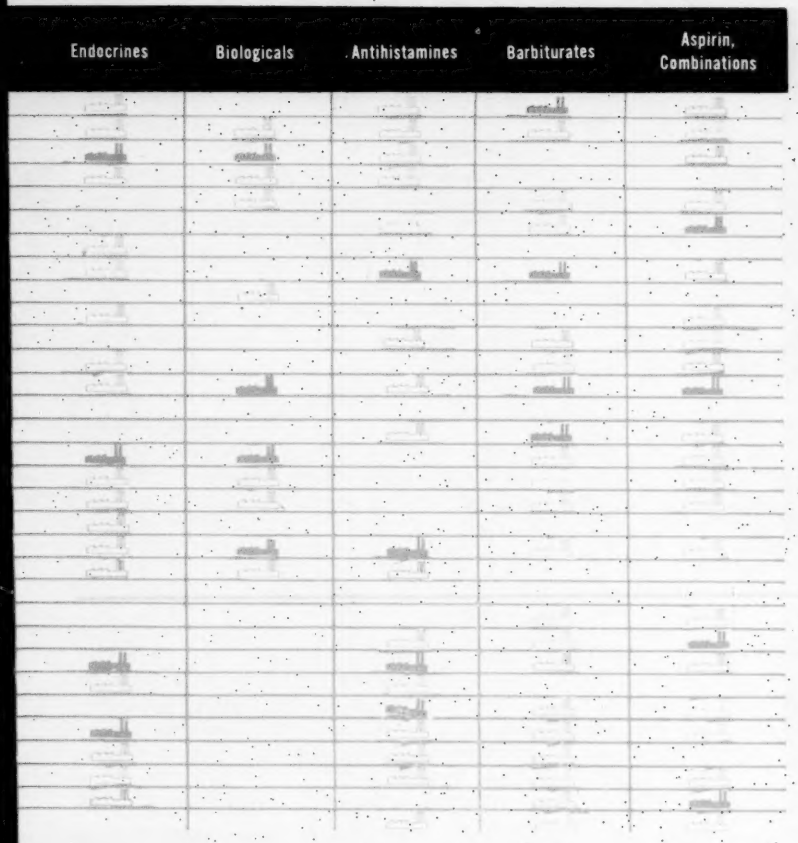
Here's an estimate of how the big vitamin items share the market: vitamin B_{12}, 25%; vitamin A, 14%; vitamin C (ascorbic acid), 24%; niacin, 7%; riboflavin, 5%; thiamine, 5%; pyridoxin, 6%; pantothenic acid, 3%; all others, 12%.

By '68, ethical vitamin sales will have soared 80%, to $450 million/year, spurred on by increasing demand in three markets: pediatrics, gynecology and geriatrics. Animal nutrition markets will contribute, too.

Sales of proprietary vitamins amount to some $175 million/year (value at the manufacturers' level). There are strong indications that ethical vitamins will expand more vigorously than the proprietary segment. Reason: vitamin makers are finding a rich market in tailoring their products to special group needs, after establishing specific vitamin requirements, instead of attempting to adhere to broad standards established on the basis of average minimum daily requirements.

Mead Johnson, for example, one of the leaders in vitamin formulation and sales, recently completed a study that established the nutritional needs of women with more than one child (75% of the children born in the U.S. will be borne by mothers who already have at least one child). Based on its findings, the company will introduce next month two new nutritional products, Natalins Comprehensive and Natalins Basic tablets, which will be promoted through doctors to this big market.

Vitamin research specialists are taking a closer look at vitamin E and some of the deficiency conditions that develop from lack of this nutritional factor. So far, testing has been restricted to animals. One new facet has turned up: many deficiency diseases hitherto attributed to vitamin E deficiency alone may be due to



simultaneous lack of vitamin E and biologically active selenium.

Among the diseases in animals traced to this lack of vitamin E and organic selenium are fatal degeneration of the liver, and degeneration of kidney, pancreas and heart muscle, and muscular dystrophy.

Recent research work on pyridoxine (vitamin B_6) indicates that deficiencies of this key nutrient factor may be more widespread and more acute among human beings than had been thought. Using tryptophane to smoke out B_6 deficiency, researchers have come up with significant new information indicating the need for greater B_6 supplementation. Vitamin B_6 sales have already experienced a substantial boost this year: pyridoxine production in the first three months of '58 totaled 16,702 lbs., compared with 3,310 lbs. in the first four months of '57.

Researchers are actively investigating some new facets of the role of vitamin B_{12} in metabolism and health. Attention now is focused on the interaction of B_{12}, folic acid and amino acids. Further research may establish needs for more B_{12}, perhaps give a substantial boost to this expensive specialty vitamin. Research in other areas indicates that B_{12} may be useful in treating skin disorders that are partly triggered by B_{12} deficiency.

About $30 million/year worth of vitamins are currently going to export markets, and by '68 the export total will probably reach $50 million a year. On the import side of the picture, interest is centered on the alleged "dumping" of niacin from Sweden. U.S. Customs officials are still investigating the dumping charge made by domestic producers, have postponed import duty appraisals of Swedish niacin, pending final determination of the fair value of niacin shipments involved.

Tranquilizers: Dramatic growth has characterized the tranquilizer group of ethical drugs.

SKF's Thorazine, which made its debut in '54, was obtained under license from Rhone-Poulenc (France), which marketed the powerful synthetic ataractic Chlorpromazine. By '55, tranquilizers had built an $85-million/year sales volume. Last year sales hit an all-time high, $196 million. Estimates for this year: a 10.3% downturn, to $175 million (10% of all ethical drug sales).

But the expected slack-off in sales apparently has no serious implications. The past year was an unusual one for tranquilizer producers. Recession hit that group harder than it did other, more solidly entrenched ethicals. And part of the fringe demand—regarded as "luxury" trade—fell off when some consumer incomes dropped late last year.

Other reasons for the sales drop: more aggressive competition from proprietary tranquilizer products extensively advertised, especially via television and radio; adverse publicity arising from government investigations into the "medicine man" tactics being used in proprietary tranquilizer advertising.

Long-range, the outlook for ethical tranquilizers seems promising. By '68, sales volumes might be $475 million a year, a 171% gain. That's based on indications that tranquilizers will enjoy broader application in the treatment of mental diseases, hypertension and metabolic disturbances, especially in combinations with other drug products (e.g., vitamins and hormones).

In addition, tranquilizers will find prime markets in animal care and nutrition. Two new products: Pfizer's Tran-Q, which is being tested for animal applications; Schering's Trilafon, being administered successfully to livestock in transit. Schering's Trilafon is the newest (it came on the market early last year). It will probably be one of the two (SKF's Com-

CW PHOTO—HANS BASKEN

Meet the Author

John Rivoire (M. Business Administration, Cornell '48) is a consultant who specializes in analyzing the markets for drugs and related products. He has worked for Food Machinery and Chemical Corp., Pfizer, Midwest Research Institute and U.S. Dept. of Agriculture, mostly on marketing and economic research projects. He's now taking a Ph.D. at Fordham University. Thesis: the changing patterns of competition in the pharmaceutical industry since the advent of antibiotics.

Last year, Rivoire was chairman of the publications committee of Chemical Market Research Assn. He's also active in American Marketing Assn. and a member of American Economic Assn.

This *CW* report comes at a time when drug company management men are calling for all possible facts and figures on the industry's outlook. Rivoire sums up current sales performance in nine key ethical product groups, projects sales trends to '68. By then, he says, total pharmaceutical sales volume will have doubled to $4.5 billion/year, ethicals accounting for 85% of sales.

Reported here are many pharmaceutical products that will enter the market in the next few months.

pazine is the other) tranquilizers to show substantial sales increases this year over '57.

SKF's Thorazine and Compazine and Wyeth's Equanil lead other tranquilizers by a big sales margin. All three are synthetic organic compounds. Rauwolfia products, like Ciba's Serpasil and Squibb's Raudixon, are still holding up well in sales performance, although as a group they're less impressive in sales volume than the synthetic organic tranquilizers.

SKF's Temaril, introduced just two months ago as a specific for itching, is administered orally, rather than topically. It illustrates the broadening potential of tranquilizers in treatments of specific psychosomatic conditions because of their action on the central nervous system.

Government purchase of tranquilizers for use in state and federal institutions amounts to a big chunk of total tranquilizer sales (an estimated 21% in '58). Exports amount to about 9% of sales.

Because tranquilizers are so new, much of the current research emphasis takes the form of synthesizing, characterizing and testing the many products that can be derived from existing compounds.

Biologicals: Another big ethical group that will probably show sales losses this year, biologicals could well be off about 6.7%, to $140 million/-year (compared with $150 million/-year in '57). They account for 9% of all ethical sales.

Eli Lilly's first-half '58 vs. '57 sales and profits illustrate the impact of the fall-off in Salk vaccine sales. In first-half '58, Lilly's net sales were down 13%, net profits 34%. On June 1, Lilly shut down its Salk vaccine facility, placed it on stand-by.

The future of biologicals should not be gauged merely by their failure to match unprecedented marks of '57, which were accomplished largely because of large sales of Salk and Asian flu vaccines. Biologicals will likely account for $350 million/year worth of sales by '68, 141% higher than today's sales. Reasons: potential development of vaccines for the prevention of (1) the common cold, (2) common childhood diseases such as measles and whooping cough, (3) respiratory infections, (4) some types of cancer.

Prior to the development of Salk polio vaccine, few new biologicals turned up. The Salk and flu vaccines gave biologicals a much-needed shot in the arm. Company researchers have renewed their interest in biologicals.

Lilly, for example, recently came up with the first improvement in rabies vaccine since Pasteur developed his pioneer product. Lilly claims its new product, grown on duck egg cultures, eliminates the small but potentially dangerous paralytic factor that Pasteur's vaccine never succeeded in destroying.

Park, Davis recently announced development of two new vaccines, Quadrigen, to combat four childhood diseases (diphtheria, whooping cough, polio and tetanus) and an adenovirus vaccine. Merck has developed and will soon introduce a vaccine called Tetravax, to compete with Quadrigen. Pfizer, the latest major entry into the biologicals market, is making a polyvalent flu vaccine that incorporates the four flu strains designated by National Institutes of Health. Pfizer and others make a special six-strain flu vaccine for the Army.

Export sales of biologicals amount

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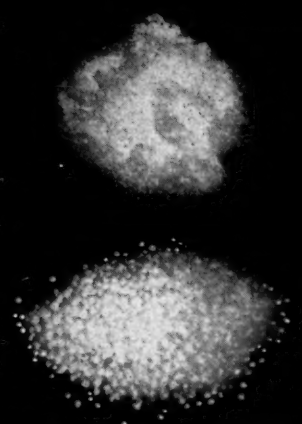

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to about $17 million/year, will likely have doubled by '68. The world market for biologicals, especially for animal disease vaccines, promises greater growth possibilities than the U.S. market. Reason: there's still a high incidence of diseases among human beings and animals overseas for which biologicals are the most satisfactory treatment, whereas the occurrence of many of these diseases (e.g., hoof and mouth disease in cattle) is insignificant in the U.S.

Behringwerke AG. (Marburg, West Germany) has been testing a new and improved hoof and mouth disease vaccine that's claimed to be six times as effective as the vaccines now used.

Pfizer now holds rights to make and sell Pasteur Institute-developed polio vaccine throughout the world, except in Communist countries or where there's a Pasteur Institute. So far, Pfizer has revealed no plans to capitalize on its license to make the vaccine, reportedly 100% safe.

Endocrines: In the past year, sales of endocrine drugs (chiefly corticoid and so-called sex hormones) have slackened their fast growth pace of the previous five years, appear to be leveling off at an estimated '58 sales mark of $140 million, up only 1.5% over last year.

Most of the big growth has come in the corticoid hormones, used mainly to treat arthritis and rheumatism, but also to control metabolism and to alleviate inflammations. Corticoids now account for about 63% of all endocrine drug sales, compared with 54% in '54. Sex hormones and other endocrines reached an estimated annual sale of $50 million in '57 and will probably gain 4% this year.

Corticoid therapy, which has become well established only in the past few years, continues to engage the interest of many pharmaceutical company and medical researchers. One promising area now being actively probed: corticoid hormone action on reproductive mechanisms, both in human beings and in animals.

Another area of investigation and development closely associated with reproductive functions involves synthetic progestational compounds. Already on the market are Searle's Enovid, Parke, Davis's Norlutin and Squibb's Delalutin. Upjohn, two month's ago, revealed the synthesis of a new progestational agent, Provera, which is claimed to be 300 times as potent as other drugs now in use.

Cortisone, hydrocortisone, prednisone, prednisolone and ACTH, and their older modifications, are still key products in the endocrine picture. But new modifications of the cortisone family—e.g., Squibb's Kenacort and Lederle's Aristocort (both triamcinolone), Upjohn's Medrol—are offering vigorous competition. Producers claim significant advantages for their new products, say they can be administered to patients with heart and mental conditions with greater safety than cortisone. Furthermore, they claim, there are fewer side-effects.

Endocrines show promise as chemotherapeutic agents in the treatment of cancer. Cortisone has already been used to treat leukemia, but incidence of side-effects has mitigated its value. Now some of the new products appear to offer possibilities of more effective action against the disease with fewer complications.

Although endocrine sales expansion appears to be temporarily arrested, the 10-year forecast is for renewed growth to a total of $500 million/year by '68, a 257% hike.

Four Smaller Groups: Four smaller groups—sulfas, antihistamines, barbiturates and aspirin compounds—currently account for a total sales volume of $154 million/year (9% of the ethical drugs market).

Sulfas have shown slow but steady growth over the years. In '54, sales were $30 million; estimates for this year are $42 million, no change from '57. By '68, sulfas will likely have hit $75-million/year sales, a gain of 67%.

There's now little new product activity in sulfas. The latest product refinements (Lederle's Kynex and P-D's Medicel) are newer dosage forms, which cut required doses to about one-sixth the previous size.

Antihistamines sales this year will be about $41 million, a 2.5% gain over '57. Ethical antihistamines face direct competition from similar proprietary products but are growing steadily. The forecast for '68 is for further growth, to $75 million/year.

Schering's Polaramine, introduced just last week, is the latest product entry into the antihistamines market. Chemically, it's defined as D-chlorpheniramine, a refinement of Chlortrimeton, a mixture of D- and L-isomers. Schering claims it has greater antihistaminic activity.

Barbiturates, the only large ethical group to show steady decreases in sales volume over the past few years, had a peak $50-million/year sales in '55, have since dropped steadily to about $38 million this year, 5% less than in '57. Prime reason for the decline: tranquilizers, better suited than barbiturates for some applications, have captured marginal barbiturate markets (for example, where mild sedation was called for).

Barbiturates, however, are not outmoded. They will probably retain the markets where they are best suited (heavy sedation and sleep inducement) and return to a total of about $50-million/year sales by '68.

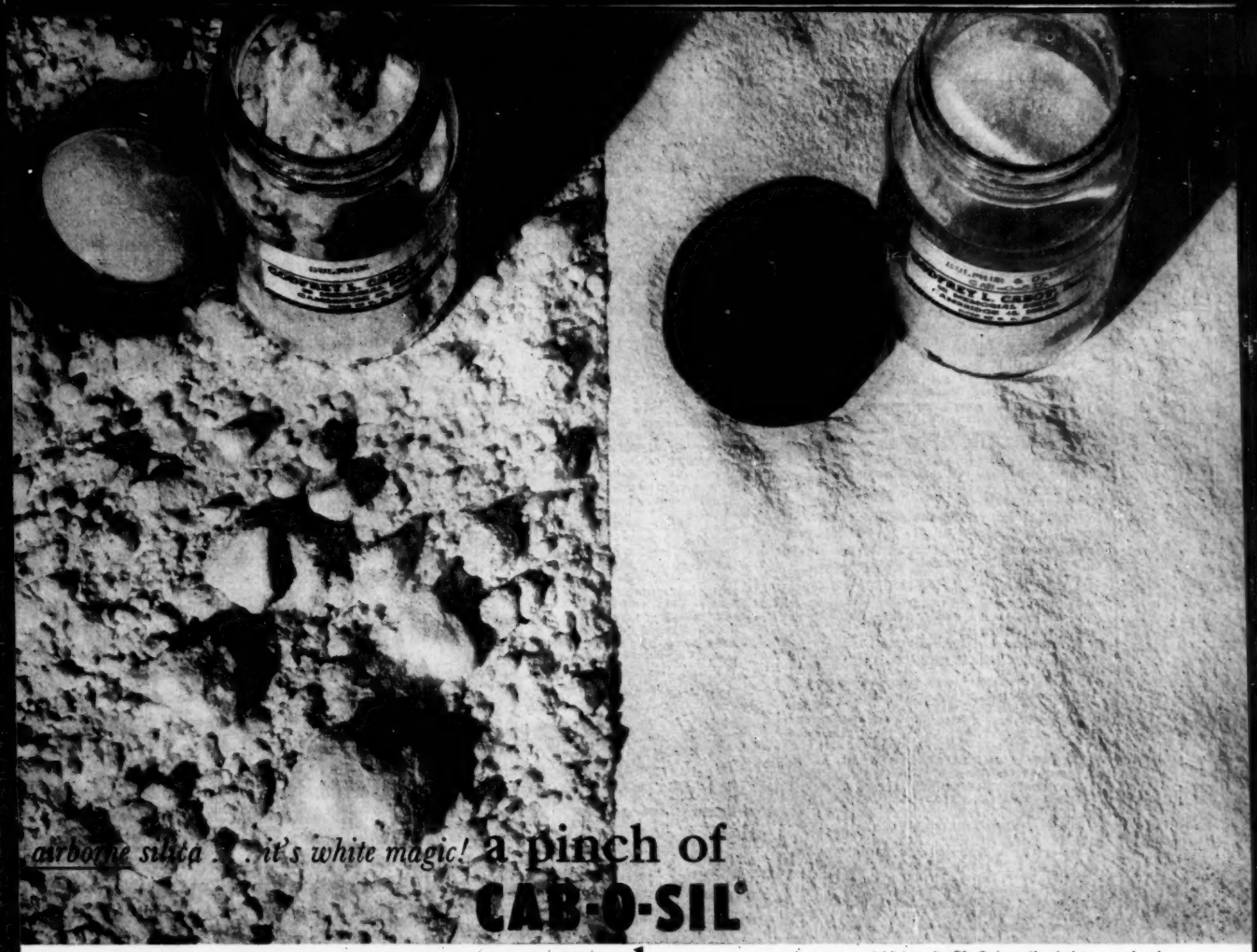
Ethical aspirin combinations show substantial growth over the years. Sales in '54 were gauged at $16 million. They rose steadily to an estimated $33 million this year, up 10% over '57. That's more than a doubling in ethical sales in only four years, despite strong competition from aspirin proprietaries.

Prospects for aspirin are related primarily to its analgesic properties, combined with low incidence of side-effects. Research interest is now focused on other properties of aspirin that suggest, for example, usefulness in heart and rheumatic ailments. One big drug company promises a new development in aspirin shortly. Aspirin outlook for '68: $75-million ethical sales, up 129%.

Big Diverse Group: Roughly 25% (equivalent to $412 million of estimated sales for '58) of all ethical drug sales fall outside the nine big groups. This "miscellaneous" group is diverse but important. Reason: it includes such key therapeutic products as ethical diuretics, antacids, laxatives, cough and cold remedies, narcotics, enzymes, antidiabetics and a number of anti-infectives other than antibiotics and sulfas.

Research and development activity abounds in this broad group. Merck's Diuril, a diuretic and hypotensive agent introduced this year, has already carved a big niche for itself (estimated '58 sales: $25 million). Oral compounds for diabetes (Upjohn's Orinase and Pfizer's Diabenese are recent examples) will probably expand in importance.

Ethical cough and cold remedies,



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CHEMICAL WEEK • ADVERTISERS INDEX

August 23, 1958

ALLIED CHEMICAL CORP. 49-54
Agency—Benton & Bowles Inc.

ALLIED CHEMICAL CORP., NITROGEN DIV. 95
Agency—G. M. Basford Co.

ALUMINUM CO. OF AMERICA 4
Agency—Ketchum, MacLeod & Grove, Inc.

AMERICAN POTASH & CHEMICAL CORP. 60
Agency—The McCarty Co.

CABOT INC., GODFREY L. 97
Agency—Larcom Randall Adv., Inc.

CATALIN CORP. OF AMERICA 14
Agency—Walter J. Gallagher Adv.

CHEMICAL CONSTRUCTION CORP. 40
Agency—Godwin Adv.

CHEMICAL SOLVENTS INC., THE C. P. .. 77

CHEMICAL WEEK 8-9

CROWN CORK & SEAL CO. 59
Agency—Aitkin-Kynett Co., Adv.

DODGE & OLCOTT, INC. 68
Agency—Culeon Adv., Corp.

DOW CHEMICAL CO., THE 12-13
Agency—MacManus, John & Adams, Inc.

DOW CORNING CORP. 16
Agency—Church & Guisewite Adv., Inc.

DU PONT DE NEMOURS & CO., INC. E. I. FREON DIV. 25
Agency—Batten, Barton, Durstine & Osborne, Inc.

DU PONT DE NEMOURS & CO., INC., E. I. POLYCHEMICALS DIV. 66-67
Agency—Batten, Barton, Durstine & Osborn, Inc.

DURIRON CO., THE ..... 4th Cover
Agency—Kircher, Helton & Collett, Inc.

EASTMAN CHEMICAL PRODUCTS INC. .. 43
Agency—Fred Wittner Adv.

EIMCO CORP., THE 5
Agency—Maisle Co.

ENJAY CO. 56
Agency—McCann-Erickson, Inc.

ETHYL CORP. 19
Agency—H. B. Humphrey Alley & Richards, Inc.

GENERAL AMERICAN TRANSPORTATION CORP. AIRSLIDE CARS DIV. 74
Agency—Edward H. Weiss & Co.

GENERAL CHEMICAL DIV. ALLIED CHEMICAL CORP. ..... 3rd Cover
Agency—Atherton & Currier, Inc.

GENERAL MILLS INC. 85
Agency—Knox Reeves Adv., Inc.

GIRDLER CO., THE 42
Agency—The Griswold Eshleman Co.

GRAVER TANK & MFG. CO. 35
Agency—Ladd, Southward & Bentley, Inc.

HALL CO., THE C. P. 80
Agency—Cruttenden Adv.

HARSHAW CHEMICAL CORP., THE 46

KELLOGG CO., M. W. 86
Agency—Fuller & Smith & Ross, Inc.

KOPPERS CO., INC. 58
Agency—Marsteller, Rickard, Gebhardt & Reed, Inc.

LILLY & CO., ELI 70
Agency—Gardner Adv. Co.

METAL HYDRIDES, INC. 78
Agency—Creamer-Trowbridge Co.

MISSISSIPPI LIME CO. 55
Agency—Ridgway Adv. Co.

MONSANTO CHEMICAL CO. 27, 82
Agency—Gardner Adv., Co.

MURRAY MFG. CO., D. J. 64
Agency—R. C. Breth, Inc.

NATIONAL STARCH PRODUCTS 69
Agency—G. M. Basford Co.

OLIN MATHIESON CHEMICAL CO. 2nd Cover
Agency—Doyle, Kitchen & McCormick, Inc.

PEERLESS OIL & CHEMICAL CORP. ... 76
Agency—G. M. Johnson & Assoc., Inc.

PETRO-TEX CHEMICAL CORP. 20
Agency—James J. McMahon, Inc.

PFAUDLER CO., THE 38-39
Agency—The Rumrill Co., Inc.

PFIZER & CO., CHARLES 63
Agency—MacManus, John & Adams, Inc.

SHELL CHEMICAL CORP. 81
Agency—J. Walter Thompson Co.

SINCLAIR CHEMICALS INC. 2
Agency—Morey, Humm & Warwick

STALEY MFG. CO., A. E. 62
Agency—Erwin Wasey-Ruthrauff & Ryan, Inc.

STAUFFER CHEMICAL CO. 61
Agency—John Mather Lupton Co.

TITANIUM PIGMENT CORP. SUB. OF NATIONAL LEAD CO. 1
Agency—Doyle, Kitchen & McCormick, Inc.

TRUBEK LABORATORIES, INC. 37
Agency—Ray Ellis Adv.

UNION CARBIDE CHEMICALS CORP. DIV. OF UNION CARBIDE CORP. ... 62, 73
Agency—J. M. Mathes, Inc.

UNITED HECKATHORN 76
Agency—Norton M. Jacobs Adv. Agency

UNITED STATES BORAX & CHEMICAL CORP. PACIFIC COAT BORAX CO. DIV. 77
Agency—Howard M. Irwin & Assoc.

U. S. INDUSTRIAL CHEMICAL CO. 31-32
Agency—G. M. Basford Co.

U. S. STEEL CORP., CHEMICALS DIV. .. 6-7
Agency—Batten, Barton, Durstine & Osborn, Inc.

VITRO ENGINEERING CO. 36
Agency—Molesworth Assoc.

WALLACE & TIERNAN, INC. 48
Agency—Branstater Associates, Inc.

WESTERN SUPPLY CO. 34
Agency—White Advertising Agency

WEST VIRGINIA PULP & PAPER CO. .. 28
Agency—Fuller & Smith & Ross, Inc.

WITCO CHEMICAL CO. 10-11
Agency—Hazard Adv. Co.

WOLF & CO., JACQUES 42
Agency—Riedl & Freede, Inc.

WYANDOTTE CHEMICAL CORP. 44-45
Agency—Brooke, Smith, French & Dorrance, Inc.

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(Classified Advertising)

F. J. Eberle, Business Mgr.

CHEMICALS: Offered/Wanted 98

EMPLOYMENT 99

EQUIPMENT: Used/Surplus New For Sale 99

WANTED 99

MANAGEMENT SERVICES 99

SPECIAL SERVICES 98

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like Upjohn's Cheracol, are growing fast. Last year's flu epidemic pushed sales of these drugs well above the trend line, but long-term growth is indicated. The same long-term outlook holds for ethical laxatives, where growth will be tied closely to geriatrics.

Overseas Activity Heightens: The buildup of capital investments overseas by U.S. drug companies is still going strong. Reason: foreign drug markets are burgeoning. To compete successfully with foreign drug companies and with U.S. companies already entrenched overseas, the big pharmaceutical producers are stepping up their manufacturing abroad.

Pfizer is completing new drug-producing facilities at Latina, Italy, and at Istanbul, Turkey. Lederle recently completed a $2-million antibiotics plant in Gosport, England. Upjohn and a French drug house, Soc. Industriel pour la Fabrication des Antibiotiques, have formed Union Chimique Atlantique S.A. to make pharmaceutical chemicals for French Union consumption. Abbott's new Buenos Aires, Argentina, drug plant has gone into production. Schering's Colombia S.A., affiliate, Undra, Ltd., is building a new facility in Bogota, Colombia, that will produce a full line of Schering products. These are several recent examples of how U.S. drug companies are responding to the challenge of foreign competition.

Very substantial chunks of total sales by U.S. drug companies result from business done overseas. Here's how foreign sales of six large drug houses contributed to total sales in '57: Abbott, 24%; Parke, Davis, 30%; Pfizer, 37%; Schering, 20%; Lilly, 20%; Merck, 27%.

AFTER THE FRACAS

Despite being harried by formidable problems—chiefly those involving alleged collusive pricing practices—the drug industry has kept its basic strengths intact. Sales are at peaks, profits are ahead of last year's, overseas activity is flourishing, R&D spending is higher than ever, capital expenditures are increasing, new breakthroughs in drug and medical technology are imminent.

There's little question among drug industry management men that the industry not only will withstand the government's barrage but also will set still-higher records.

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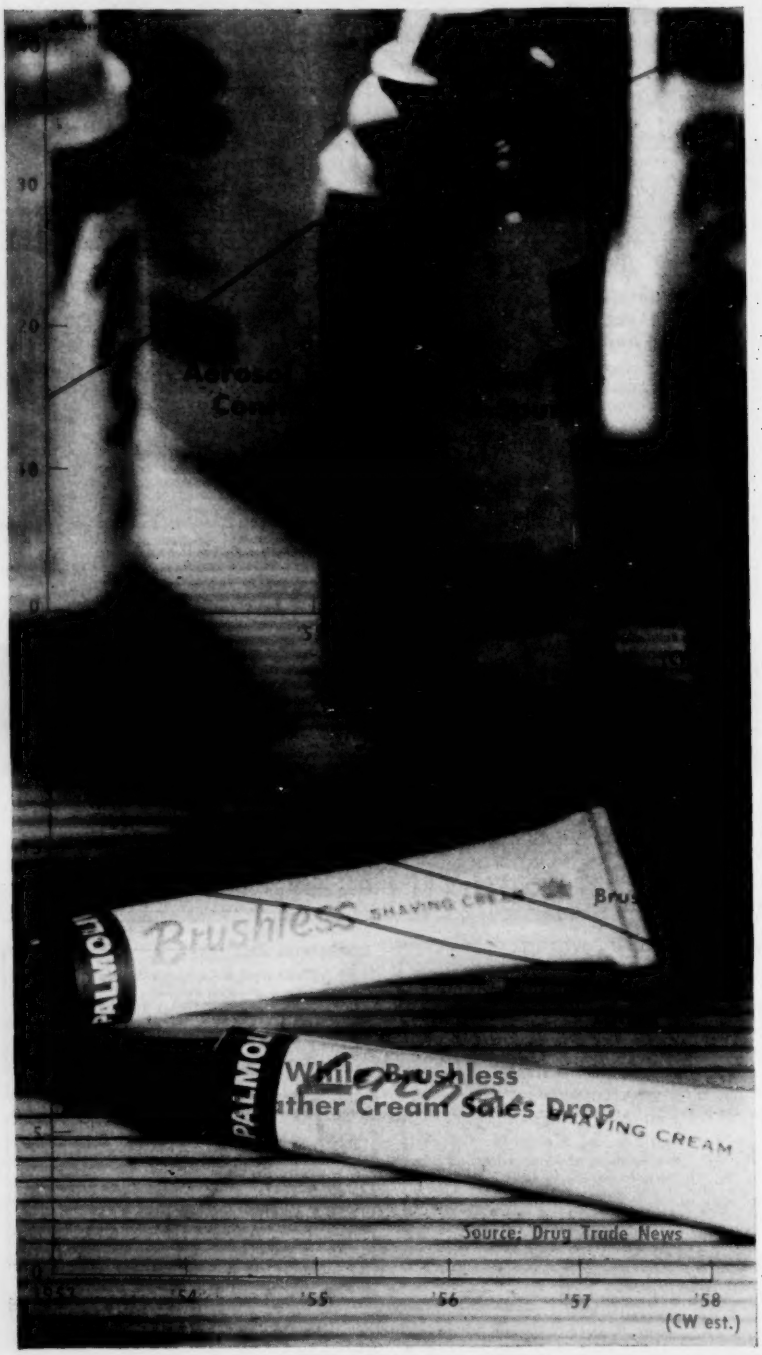

Retail sales of mens' shaving creams are expected to hit an all-time high of about $61 million this year. Sales of aerosol shaving creams will account for about 66% of that total, some $40 million worth. Back in '53, purchases of aerosol-type creams amounted to less than $15 million—31% of the total. But within five years, greater demand for the aerosols has hiked sales 165%.

Sales of brushless and lather shaving creams, consequently, have been knocked from their positions of five years ago. In '53, brushless shaving creams were most preferred by U.S. males; sales were $18.7 million. Aerosol creams, which had already gained a strong foothold, then held second place, with sales near $14.9 million. Lather cream sales ran a close third, $14.5 million.

This year, brushless sales are expected to plunge to $11 million. Lather cream sales will likely continue backsliding, may hit a low of $9.5 million.

Reason for aerosol preference is, of course, easy and no-mess application. Shave cream producers (most of which make all three types) expect aerosol shaving creams to continue capturing a larger share of the market.

One industry spokesman, however, points out that the potential growth of the aerosol-type cream has been somewhat crimped by the advent of electric shavers. This year's sales of the electrics will reach an estimated 7 million units, twice '53's sales.

Chemicals going into the production of all types of shaving cream: stearic acid, glycerine, potassium hydroxide, sodium hydroxide, emulsifiers, synthetic perfumes.

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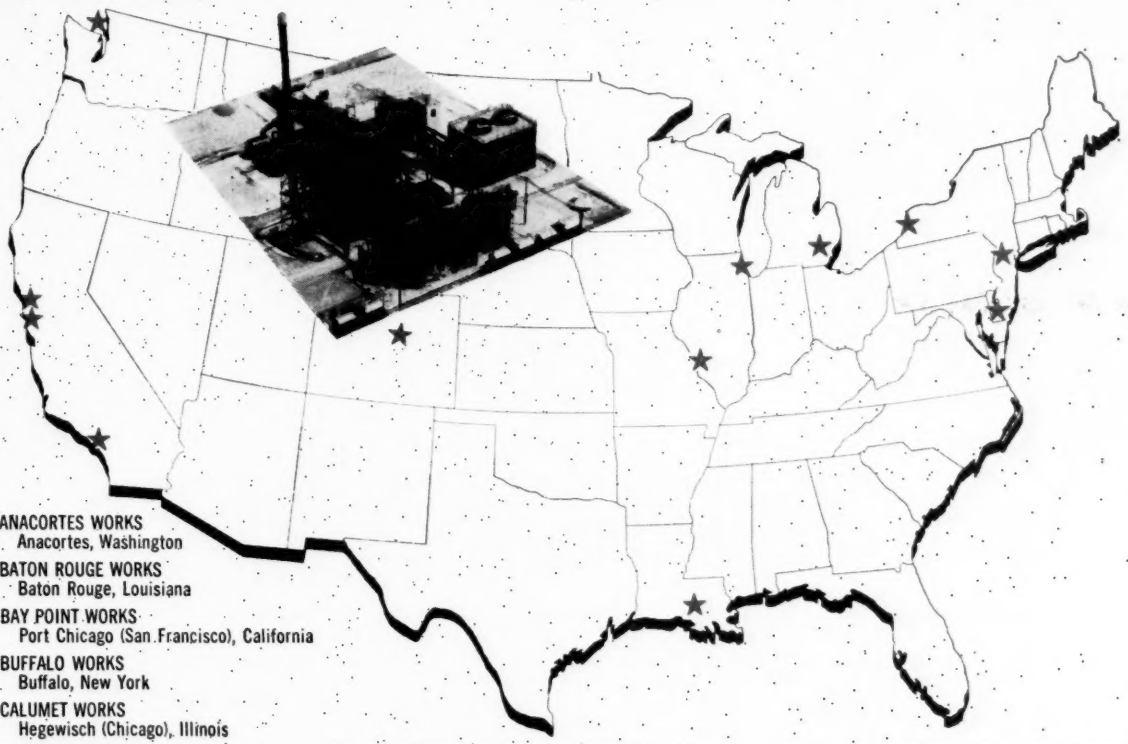

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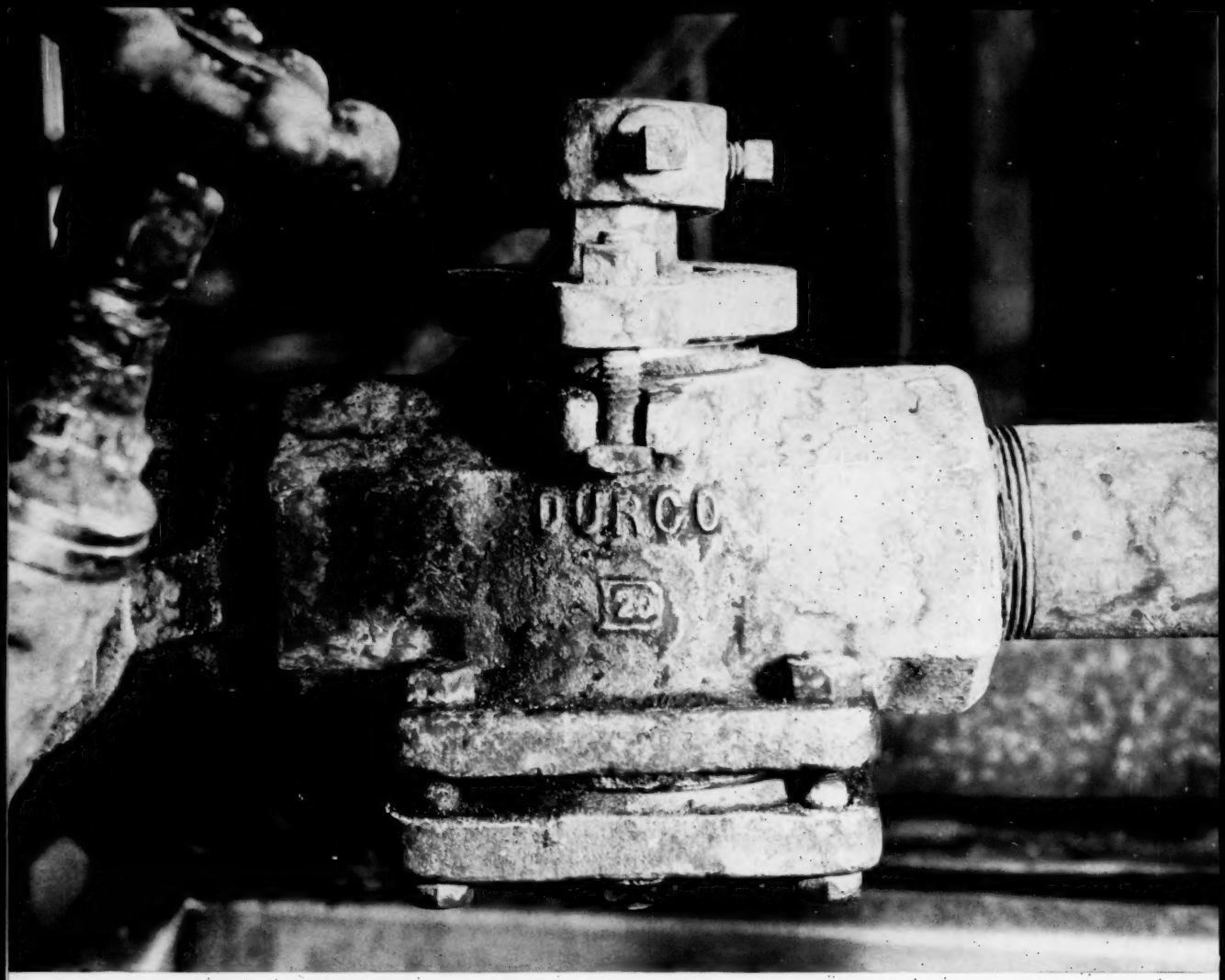

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